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Debt and International Finance

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Sovereign Debt

A Primer

Jonathan Eaton

A survey of analyses of Harrod-Domar and two-gap models of debt and growth; optimizing models of borrowing; solvency, debt, and endogenous growth; sovereign risk; incentives to repay; the role of sanctions and reputation in dealing with recalcitrant debtors; debt relief and the "debt Laffer curve"; the role of official lenders; and debt buybacks.

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This paper — a product of the Debt and International Finance Division, International Economics Department — is part of a larger effort in the department to understand the relationship of external borrowing to economic development. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Sheilah King-Watson, room S8-040, extension 31047 (83 pages). February 1992.

The troublesome debts of many developing countries have spawned much literature on why countries borrow, on what debt contributes to growth, on why countries repay, and on how to deal with existing debt. Eaton provides an analytical primer on the following aspects of sovereign debt:

- The basic accounting concepts associated with debt and some data, particularly about the net resource transfers associated with external borrowing.

- The mechanics of debt and growth implied in the Harrod-Domar and two-gap growth models. Eaton points out how this analysis can yield misleading conclusions about the sustainability of debt and the determinants of solvency.

- Debt as a component of an optimizing model of borrowing in a competitive loan market, when the borrower faces an intertemporal budget constraint.

- Debt as a component of recent models of endogenous growth. Eaton concludes that what debt contributes to growth depends greatly on the source of growth.

- Problems arising from sovereign risk, including problems of liquidity, enforcement, and revenue-raising to finance repayment (and the attendant problem of capital flight).

- Incentives to repay. Maintaining access to credit markets can by itself be a reason to repay enough to sustain substantial debt levels.

- Options available to a creditor whose debtor is unwilling to meet current debt-service obligations.

- Debt buybacks. Eaton concludes that in the absence of any efficiency cost imposed by outstanding debt (so that the only implications of the form and extent of repayment are for the distribution of surplus between borrower and lender), how much a buyback benefits the borrower depends on how much buying back debt reduces what is available for repayment later.

Eaton also concludes that if there are efficiency losses associated with debt (a "debt overhang"), debt forgiveness can benefit both a debtor nation and its creditors. Contrary to claims in the literature, this outcome does not require that a reduction in the face value of debt raise its market value (a "debt Laffer curve"), and the debtor benefits even though the buyback raises the market price of the debt. The efficiency argument for buybacks is inconsistent with the case for lengthening the debt's maturity.

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SOVEREIGN DEBT: A PRIMER

Jonathan Eaton

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SOVEREIGN DEBT: A PRIMER

1. Introduction

The recent debt problems of a number of developing countries, and the potential demand for foreign capital by formerly socialist countries, raises a number of basic questions about the role of sovereign debt in economic development and growth. My purpose here is to provide a basic, albeit analytic, introduction to some issues raised by foreign borrowing, especially foreign borrowing by sovereign governments from private creditors.

The paper is not meant to be a survey of the literature. A number of issues are ignored, and I have not attempted to provide a complete set of references to the literature.[1] Indeed, a number of important contributions are unmentioned. Rather, I have tried to identify areas: (i) where recent analytic developments may provide useful tools, or at least food for thought, for the applied economist; (ii) that are likely to present pitfalls; or (iii) where the existing literature seems to have generated confusion. I have then attempted to provide rudimentary frameworks: (i) for applying existing analytic tools to applied problems; (ii) to show where traditional analysis can lead one astray; (iii) to clarify what I find to be misleading or confusing points in the existing literature.

Section 2 presents some basic accounting distinctions, and discusses data on the debt to private creditors of a number of large sovereign debtors.

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[1]I refer readers to Glick and Kharas (1984), Eaton, Gersovitz, and Stiglitz (1987), Eaton and Taylor (1987) and Eaton (1989a) for treatments of a wider range of issues and more comprehensive bibliographies.

Sections 3 and 5 concern the contribution of debt to growth. Section 3 reviews traditional nonoptimizing or "knife-edge" models of borrowing, such as the Harrod-Domar and the two-gap models. Here I discuss such notions as "debt-traps" and "Ponzi schemes." In Section 4 I turn to intertemporal optimization, introducing the intertemporal budget constraint and the "transversality condition" on borrowing. A particular purpose is to point out where knife-edged analysis can mislead. Section 5 then considers borrowing in a recent class of optimizing growth models in which the rate of growth is endogenous. While the focus, as in the nonoptimizing literature, is on the relationship between debt and growth, the methodology is quite different. I consider two particular contributions to this literature, one by Lucas (1988) and one by Cohen (1991) and point out how different assumptions about the source of growth have very different implications for the role of foreign borrowing in economic development.

Sections 3 through 5 consider debt in a world in which debt contracts with sovereign debtors are automatically and costlessly honored. Hence, as long as a nation has the resources to pay its creditors what it owes, it does so. The remaining sections consider problems that arise from a sovereign government's potential inability to appropriate domestic resources to service debt, or its unwillingness to service debt. Section 6 discusses four particular issues: (i) the excess burden associated with taxing domestic resources to repay debt (the "public finance" problem), (ii) the "liquidity" problem, (iii) the "enforcement" problem, and the "information" problem. Section 7 considers the incentives a sovereign debtor has to service its debt, and what these incentives imply about how much debt it can sustain. A particular issue is whether a nation's desire to maintain a "reputation for creditworthiness" alone can provide an incentive to service debt, a point

about which a great deal of confusion was recently introduced. In section 8 I review the options facing creditors whose sovereign debtors are not paying what they owe. Here I discuss debt relief, the role of official lenders, and the notions of a "debt overhang" and the "debt Laffer curve." In Section 9 I turn to "market-based" debt reduction schemes, such as various swap arrangements and debt buybacks. Section 10 concludes with a brief review of other issues.

2. Some Basic Concepts and Magnitudes

Some simple distinctions among the various stocks and flows associated with debt should be made. Starting with stocks, one distinction is between disbursed and undisbursed debt, the second consisting of commitments made by lenders that have not been drawn upon, and therefore are not yet accumulating interest. Part of disbursed debt is interest arrears, accumulated unpaid interest obligations. Henceforth, by "debt" (or D_t) I mean "disbursed debt."

Turning to flows, debt service payments in period t (DS_t) consist of interest payments (IP_t) and principal repayments (PR_t) associated with disbursed debt. Thus $DS_t = IP_t + PR_t$. The net flow in period t (B_t) is new borrowing (loan disbursements plus accumulation of arrears) in period t (NB_t) less repayments of principal, i.e., $B_t = NB_t - PR_t$. This is the amount by which the nominal stock of disbursed debt changes in period t. Hence (denoting the change in variable x as $\dot{x}$), $B_t = \dot{D}_t$.

Finally, the net transfer in period t (NT_t) equals the net flow less interest payments or, equivalently, new borrowing less debt service, i.e., $NT_t = B_t - IP_t = NB_t - DS_t$. This concept is especially critical in that it represents the net flow of real resources from creditors to the debtor. A positive value means that creditors are contributing resources to the debtor country while a negative value means that creditors are taking resources away. A hypothetical observer privy to a nation's complete set of international transactions concerning goods and services (other than interest payments) and its foreign aid receipts could ascertain the net resource transfer even if it could not observe any balance sheets or financial transactions.

The appendix presents annual data on disbursements, principal and

interest payments and the consequent net resource transfers between twenty-six highly-indebted countries and their private creditors during 1970-1988. Values are in current U.S. dollars. A negative number (in parentheses) indicates a net resource transfer to the creditor.

For each country, the bottom row gives the 1969 present value of the net transfer, where the 3-month U.S. Treasury Bill rate serves as discount factor. For each country, the upper figure in the final column is the number of times the net resource transfer changed sign during the nineteen year period. The lower figure is the 1969 present value of the cumulative net resource transfer as of the end of 1988.

Two observations are worth making. One, to be taken up later, is that net resource transfers change signs quite often, on average every three or four years. Second, as of the end of 1988, only three of the twenty-six countries had made net resource transfers to creditors over the entire period: Costa Rica, Jamaica, and Yugoslavia. For the rest, the relationship between private creditors and debtors has meant a significant real net transfer from private creditors (as a group) to the borrower.

3. Debt and Growth: "Knife-Edged" Analysis

How does debt relate to the growth of the debtor? Early on, economists put the Harrod-Domar growth model, due to Harrod (1939) and Domar (1946), to work to answer this question. This framework describes an economy very simply with four parameters: (1) the capital-output ratio, $1/\alpha$, (2) the savings ratio out of income, s, (3) the rate of growth of the effective labor force, n, and (4) the rate of depreciation of the capital stock δ. These variables are assumed exogenous and constant over time.

For a closed economy, the growth rate "warranted" by savings and technology, g^w, is given by:

$$g^w = s\alpha - \delta \tag{3.1}$$

This relationship follows from the fact that the change in the capital stock ΔK is given by investment, which equals savings or sQ, where Q is output less depreciation δK. Dividing both side by K gives the result. Since Q is proportional to K, Q and K grow at the same rate. An obvious problem is that g^w may not equal the natural growth rate n, the "knife-edge" problem.

Rosenstein-Rodan (1961), for example, used this formulation to calculate "aid requirements," meaning the amount of foreign aid needed to bring the warranted growth rate into line with the natural rate. Assuming that a constant share s' of foreign aid is saved, and treating aid as a fraction a of output, the warranted rate adjusted for aid becomes:

$$g^w = (s + s'a)\alpha - \delta, \tag{3.2}$$

so required aid as a share of output is $a^* = (n + \delta - s\alpha)/\alpha s'$.[2]

3.1 The Mechanics of Debt Dynamics

The model can also be applied to foreign debt. Denote net foreign debt at any time t as D_t and the ratio of debt to output as d_t. If r is the interest rate (assumed constant) then period t interest payment obligations are rD_t, while net borrowing is $\dot{D}_t$. The net transfer is $\dot{D}_t - rD_t$.

The issue of identifying the appropriate income concept for savings now arises. To be quite general, let s denote the savings rate out of output, s' the dissavings rate out of interest payments, and s" the savings rate out of net borrowing. Thus:

$$\dot{K} = s\alpha K_t - s'rD_t + s"\dot{D}_t - \delta K. \tag{3.3}$$

Since $\dot{D}_t/K_t = \alpha\dot{d}_t + \alpha d_t\dot{K}_t/K_t$, where $d_t = D_t/Y_t$, the ratio of debt to output:

$$g_t = \frac{\dot{K}_t}{K_t} = [(s - s'rd_t + s"\dot{d}_t)\alpha - \delta]/(1 - s"\alpha d_t). \tag{3.4}$$

The rate of change of the ratio of debt to output is therefore:

$$\dot{d} = \frac{g - g^w + (s'r - s"g)d\alpha}{s"\alpha}. \tag{3.5}$$

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[2]In Eaton (1989a) I provide more complete references on applications of Harrod-Domar analysis to aid and debt problems.

(with time subscripts omitted).

If the debt-output ratio is maintained at some constant level $\bar{d}$ then the warranted growth rate allowing for debt, g^d, is:

$$g^d = (g^w - s'r\bar{d}\alpha\delta)/(1 - s''\bar{d}\alpha). \qquad (3.6)$$

The long-run effect of of a permanent change in the ratio of debt to output on growth can be obtained by differentiating this expression with respect to $\bar{d}$. The result is that higher debt raises growth if and only if $s''(s\alpha-\delta) > s'r$. If, say, the dissavings rate out of interest payments equals the savings rate out of new borrowing ($s' = s''$) then <u>higher debt raises the growth rate if and only if the warranted growth rate for the closed economy exceeds the interest rate</u>.

Similarly, if a particular growth rate $\hat{g}$ (such as the natural rate) is to be sustained with a constant ratio of debt to output, then the debt-output ratio must attain a level:

$$\bar{d} = \frac{s\alpha-\delta-\hat{g}}{(s'r-s''g)\alpha} = \frac{g^w-\hat{g}}{(s'r-s''g)\alpha}. \qquad (3.7)$$

If $s' = s''$ then the sign of this expression depends upon the relationship between the target growth rate $\hat{g}$, the warranted growth rate g^w and the interest rate. Positive debt is called for either when the warranted rate and interest rate both exceed the target rate or both are exceeded by the target rate.

3.2 Stability and the "Debt Trap"

Stability requires that $\dot{d}$ be negative when d is just above $\bar{d}$ and positive when d is just below $\bar{d}$. Differentiating (3.5) with respect to d gives:

$$\frac{\dot{dd}}{dd} = \frac{s'r - s''\hat{g}}{s''},$$

which must be negative for stability. Hence, if $s' = s''$, stability requires that the actual growth rate exceed the interest rate.

If this condition is <u>not</u> satisfied then an increase in debt above $\bar{d}$ raises interest obligations more than it raises the additional borrowing that can occur to maintain a steady $\bar{d}$. Ever-increasing amounts of debt relative to output are thus needed to finance debt service payments. A predicament of this sort is sometimes called a "debt trap."

3.3 Steady-State Debt and Ponzi Schemes

If the stability condition is satisfied then, from (3.7), the steady-state debt-output ratio is positive or negative depending upon whether the desired growth rate exceeds or is exceeded by the warranted rate. For the economy to grow faster than what is warranted by domestic saving requires positive debt. Since the stability condition is satisfied, new borrowing is always sufficient to repay interest on old debt <u>and</u> finance additional investment without raising the ratio of debt to output.

This analysis has led to the conclusion that a debtor country is "solvent" or "creditworthy" if it grows at a faster rate than the interest

rate, as countries occasionally do and as many of the current highly-indebted countries did during the 1970s.

There are several reasons, however, why this criterion is a misleading indicator of a country's creditworthiness.

First, it is unlikely that the underlying parameters of the analysis, such as the capital-output and savings ratios, will remain constant over the long term.

A second, related, reason is that the stock of net debt itself should have implications for a country's savings behavior. The assumption that savings depends on income flows implies that, other things equal, as a country becomes more indebted it saves less (since its interest obligations rise). But it might seem reasonable to assume that as a country becomes more indebted, anticipated future debt-service obligations would raise savings.

Third, and most important, if a country's output perpetually grew faster than the interest rate and it maintained a constant debt-output ratio, then net borrowing would perpetually exceed interest payments, meaning that the net transfer associated with debt would forever be positive. This is inconsistent with rational behavior on the part of lenders. It the stock of debt could forever grow faster than the interest rate then any debtor could successfully set up a "Ponzi" scheme, using new borrowing to pay off old debt. Demand for debt to finance such schemes would eventually drive the world interest rate to at least the growth rate of loanable funds.

The second objection can be overcome by introducing an explicit direct feedback from the stock of debt to domestic savings. Say that for each additional unit of debt, domestic savings increases by σ. With this modification, accumulation of debt per unit of output becomes:

$$\dot{d} = \frac{(\hat{g}-g^{w})/\alpha + (s'r-s''g-\sigma)d}{s''} \quad . \tag{3.6}$$

Stability is now guaranteed by the condition that $s'r - s''\hat{g} - \sigma < 0$. The steady-state ratio of debt to output associated with a growth rate g is then:

$$\bar{d} = \frac{(g^{w}-\hat{g})/\alpha}{s'r-s''g-\sigma} \quad . \tag{3.7}$$

Note that, as before, the condition for stability implies that a country become a de,tor to maintain a growth rate permanently in excess of the rate warranted by domestic resources. Even if $s' = s''$, however, it need not be the case that creditors make perpetual net transfers to the country to raise its growth rate. Going into debt can raise a country's growth rate even when the country is making net transfers to creditors. Indebtedness raises the growth rate by raising domestic savings.

3.4 Two-Gap Models

The Harrod-Domar model, and the analysis of debt dynamics that follows from it, assume a single, homogeneous output that can also serve as the capital stock. The amount of output allocated toward investment, and the incremental capital-output ratio thus limit the growth rate.

The two-gap model posits that output requires not only physical capital that can be produced domestically, but an imported input (that could also be a capital good) that is not produced domestically. Both domestic capital and the imported input are essential for production, and the standard assumption is that they are needed in fixed proportions. If K_d denotes the stock of

domestic capital and K_f the stock of the imported input then output Q is given by:

$$Q = \min[\alpha K_d, \beta K_f]$$

where β is some positive parameter.

If domestic savings is a proportion s of income Y, in the absence of foreign aid, lending, or depreciation (δ=0) the growth rate "warranted" by domestic savings is now s/κ where $\kappa = 1/\alpha + 1/\beta$.

For the economy to grow at this rate, however, requires an investment of foreign capital I_f equal to a share $s/\beta\kappa$ of output each period. Obtaining this foreign capital with domestic savings does not pose an additional problem if it can be purchased at a given price with domestic output. The analysis assumes, however, that this is not the case, but rather that the supply of foreign capital has an upper bound proportional to capacity. If ϵ denotes the availability of foreign capital relative to capacity then the warranted growth rate can be sustained as long as $\epsilon\beta > s/\kappa$. Otherwise, the availability of foreign capital, rather than domestic savings, limits growth, and the maximum sustainable growth rate is $\epsilon\beta$. In this case increases in the domestic savings rate do not increase growth.

This framework has been called the "two-gap" model because there are now two possible resource gaps that keep the actual growth rate below the growth rate of the labor force, or the "natural" growth rate. One is the gap in domestic savings. The other is the gap in foreign exchange.

Say that foreign exchange is indeed the binding gap, so that in the absence of foreign debt growth is constrained to $\beta\epsilon$. Foreign borrowing obviously provides an additional source of foreign exchange, but servicing

debt is an additional use. Again, denoting total foreign debt in period t by D_t and the ratio of debt to output as d_t, the growth rate "warranted" by the availability of foreign capital, g^f, becomes:

$$g_t^f = \frac{\beta(\epsilon+\dot{d}_t-rd_t)}{1-\beta d_t} .$$

If in the long-run a constant ratio of debt to output is maintained, so that $\dot{d}_t = 0$ and $d_t = \bar{d}$, then the warranted growth rate g^f is given by:

$$g^f = \frac{\beta(\epsilon - r\bar{d})}{1-\beta\bar{d}} .$$

The basic implications are qualitatively similar to those of the Harrod-Domar analysis:

First, the long run effect of an increase in $\bar{d}$ on g^f is positive or negative as $\beta\epsilon$ exceeds or is exceeded by r. As in the basic Harrod-Domar model, if the growth rate in the absence of borrowing exceeds the interest rate then net borrowing has the long-run effect of increasing growth even further while, if in the absence of borrowing the warranted growth rate is lower than the interest rate, net borrowing lowers the warranted growth rate.

Say that the economy tries to use borrowing to achieve a target growth rate $\hat{g}$. The long-run level of debt necessary to do this is given by:

$$\bar{d} = \frac{\beta\epsilon-\delta-\hat{g}}{\beta(r-\hat{g})} = \frac{g^f-\hat{g}}{\beta(r-\hat{g})} .$$

Again, as with the Harrod-Domar model, a positive level of debt is implied

only when the target rate is either below the warranted rate and the interest rate or above these two rates.

Finally, for any given growth rate g, the change in the debt-output ratio is given by:

$$\dot{d} = \frac{g - g^f}{\beta} + (r-g)d,$$

Again, stability requires a growth rate in excess of the interest rate. As in the simpler Harrod-Domar model, the stability condition implies that a positive permanent level of debt is associated with growth above the warranted rate.

3.5 Implications of the "Knife-Edge" Models

The Harrod-Domar and two-gap models have been popular tools for analyzing the debt problems of developing countries. For one thing, they allow the analyst to make long-term projections with a minimal amount of data. Nevertheless, there are at least two reasons why they can yield very misleading results:

First, there is little reason to think that the magnitudes they treat as constants should be. Opportunities for substitution between capital and other factors imply that the capital-output ratio should rise with nore investment. In fact, capital-output ratios can fluctuate wildly. Similarly, the savings rate should depend on more than current income and the stock of debt. A framework should base its assumptions about how investment affects output and about savings on a more complete description of technology and the intertemporal trade-offs facing the economy.

Second, and more fundamentally, the analysis makes unreasonable assumptions about the resources that a competitive world loan market can be expected to provide a borrowing country. Stability in these models requires a growth rate in excess of the world interest rate. But if the country maintains a constant debt-output ratio then its debt must also grow faster than the interest rate. Creditors must always lend the country more than what it owes to service past debt so that it never needs to make net resource transfers to its creditors. Moreover, the faster it grows, the more resources it can perpetually obtain from the rest of the world. This state of affairs is unsustainable, however. In order for the country not, at some point, to exhaust the world supply of funds, world wealth must also grow forever at least as fast as the country. But then anyone could always borrow whatever was needed to repay past debts. Attempts to do so would drive the world interest rate up to at least the growth rate of world wealth, however. While we have observed growth rates far in excess of interest rates, the phenomenon has necessarily been a temporary one. The next section discusses how the constraints that world capital markets impose on borrowers render the scenarios created by the knife-edge models infeasible.

4. Intertemporal Optimization, the Budget Constraint, and Solvency

A critical shortcoming of the knife-edge analysis is that savings behavior, which is closely tied to the accumulation of foreign debt, is not related to rational intertemporal decision-making on the part of the borrowing country or its creditors.

A very basic formulation that introduces a motive for borrowing considers a small borrowing country as an entity with a given income stream, with per period output Q_t. The country's behavior is governed by that of a representative, constituent individual (or dynasty) that seeks to maximize the discounted value of its utility from consumption. A common simplification is that utility is additively separable across time, and that utility in any period t is a concave function $u(C_t)$ of consumption C_t in period t. Consumption cannot be negative. The representative individual discounts future consumption by some factor β (which equals one over one plus its discount rate, as it is more conventionally defined). Hence β is between zero and one, with values nearer one implying less discounting of the future. It can borrow and lend in international credit markets at an interest rate r, which I will usually treat as a constant to simplify notation.

Consider a time 0 when the country's foreign debt is zero. As of that point, its objective can be described as maximizing a function of the form:

$$U_0 = \sum_{t=0}^{\infty} \beta^t u(C_t) \qquad (4.1)$$

Each period t it chooses to borrow some net amount B_t (defined as new borrowing less repayments of principal on old debt), but must pay interest

rD_{t-1} on debt accumulated as of the end of the previous period. What is left over for consumption is then:

$$C_t = Q_t + B_t - rD_{t-1} = Q_t + NT_t \tag{4.2}$$

while debt at the end of period t is:

$$D_t = D_{t-1} + B_t = (1+r)D_{t-1} + NT_t \tag{4.3}$$

Iterating the second part of equation (4.3) backward to period 0 gives:

$$D_t = \sum_{i=0}^{t} (1+r)^{t-i} NT_i . \tag{4.4}$$

Debt in period t is just the cumulative discounted net resource transfers since period 0 (when debt was zero).

Obviously, if the country faces absolutely no limit on what it can borrow in any period, it can attain an arbitrarily high level of consumption in any period without defaulting by financing debt-service obligations with new borrowing. What keeps a country from pursuing such a borrowing strategy?

The problem is that allowing a country to do this would be inconsistent with rational lender behavior. Sensible lenders would not enter into transactions with a country that would imply a loss. This means that, as of period 0, the anticipated discounted value of resource transfers that they would provide the country not exceed 0, or that:

$$\sum_{t=0}^{\infty} \frac{NT_t}{(1+r)^t} = \sum_{t=0}^{\infty} \frac{C_t - Q_t}{(1+r)^t} \leq 0, \tag{4.5}$$

This last condition is often called the intertemporal budget constraint.

Dividing (4.4) by $(1+r)^t$ gives:

$$\frac{D_t}{(1+r)^t} = \sum_{i=0}^{t} \frac{NT_i}{(1+r)^i} \tag{4.6}$$

Expressions (4.5) and (4.6) imply the following restrictions on debt:

Solvency

Substituting (4.6) into (4.5) gives, for any period t:

$$D_t \leq \sum_{\tau=t+1}^{\infty} \frac{Q_\tau - C_\tau}{(1+r)^{\tau-t}}.$$

Since consumption cannot be negative, this condition implies that:

$$D_t \leq W_t, \tag{4.7}$$

where

$$W_t = \sum_{\tau=t+1}^{\infty} \frac{Q_\tau}{(1+r)^{\tau-t}},$$

the present discounted value of the borrowing country's remaining income stream. Condition (4.7), often called the solvency constraint, states that debt in any period cannot exceed this amount if lenders are to find their relationship with the borrower profitable.

In principle, the right hand side of (4.7) could be infinite, in which case the constraint disappears. This would mean that the country's current and future resources are infinitely valuable, which could happen if the country grew on average at a rate in excess of the interest rate.

Presumably, the demand for borrowing on the part of such a country would suffice to drive the world interest rate up to the point at which the constraint became binding. As mentioned, some of the literature on external debt talks of "solvency" as a condition that its growth rate exceed the interest rate. For a country to be permanently solvent in this sense implies that it have resources that are infinitely valuable, in which case any level of debt is consistent with solvency. It is unlikely that any country meets this criterion. A growth rate in excess of the interest rate is almost surely a temporary phenomenon. On the other hand, as discussed below, almost all sovereign borrowers are probably solvent in the sense that the discounted present value of their national resources exceeds the value of their external debt.

The "Transversality Condition"

Together, (4.5) and (4.6) imply that

$$\lim_{t\to\infty} \frac{D_t}{(1+r)^t} \leq 0, \tag{4.8}$$

often called the transversality condition: In order to realize a collective positive return on their loans, foreign creditors cannot allow the discounted value of debt in the infinite future to be positive. As is clear from (4.3) a borrowing strategy that never required making net resource transfers to

creditors would require that debt grow at or above the rate of interest, violating (4.8). Note that the condition allows D_t to remain positive, i.e., the country can remain a net debtor forever. Debt just can't grow, on average, faster than the interest rate.

The country's problem then, can be seen as choosing NT_t in each period t to maximize U_0 subject to either (4.5) or (4.8). Setting this problem up as a constrained maximization, it becomes:

$$\max_{C_t} \{ \sum_{t=0}^{\infty} [\beta^t u(C_t) + \lambda(\frac{Q_t - C_t}{(1+r)^t})] \} \tag{4.9}$$

where λ is the shadow price associated with the solvency condition.

The first-order conditions for a maximum are:

$$[(1+r)\beta]^t u'(C_t) = \lambda \quad \forall t = 0, \ldots, \infty \tag{4.10}$$

With nonsatiation (so that the marginal utility of consumption is always strictly positive), λ is strictly positive, meaning that the constraint is binding. Optimal borrowing thus implies that condition (4.5) hold with equality, or that:

$$\sum_{t=0}^{\infty} \frac{C_t}{(1+r)^t} = W_0.$$

One implication of (4.10) is that, given the discounted present value of initial resources W_0, international borrowing and lending completely separate the timing of consumption from that of production. The intertemporal budget constraint is the only link between the two. Hence, given the present

discounted value of resources, the timing of their availability should have no implications for consumption.

A second implication of (4.10) is that consumption rises or falls over time depending upon whether $(1+r)\beta$ is larger or smaller than one, or whether the world interest rate is higher or lower than the country's time discount rate.

As an example, consider a borrowing country whose representative consumer has a one-period utility function:

$$u(C_t) = \frac{C_t^{1-\sigma}}{1-\sigma}$$

where the (nonnegative) parameter σ corresponds to the (constant, in this case) elasticity of the marginal utility of income, or, equivalently, the degree of relative risk aversion. The solution involves choosing:

$$C_t = [(1+r)\beta]^{t/\sigma}[1-\beta^{1/\sigma}(1+r)^{(1-\sigma)/\sigma}]W_0$$

Say that Q_t grows at a constant rate g. Then

$$W_0 = \frac{(1+r)Q_0}{r-g},$$

while the present discounted value of current and future resources in any subsequent period is $(1+g)^t W_0$. Debt at the end of period t-1 is then:

$$D_{t-1} = \sum_{\tau=t}^{\infty} \frac{Q_\tau - C_\tau}{(1+r)^\tau} = W_0((1+g)^t - [(1+r)\beta]^{t/\sigma}).$$

The country becomes a debtor if $1+g > [(1+r)\beta]^{1/\sigma}$ and a creditor otherwise.

Note that debt grows faster the higher the exogenous growth rate of income, the higher the discount factor, and the lower the rate of interest.

The analysis can be extended to incorporate a productive role for capital. As long as the production technology and other factors of endowment are exogenous, however, little in this analysis is affected. Say, for example, that output in period t is a function $F(K_t, L_t, t)$, where L_t is a set of exogenous factor supplies such as labor and land, and where F is homogeneous in K_t and L_t. Optimal investment requires investing up to the point at which $F_K = r$, where F_K is the marginal product of capital. Let $K^*(L_t, t)$ denote the value of K consistent with optimal investment. Defining $Q_t = F(K^*, L_t, t)$ and redefining foreign debt D'_t as $D_t + K^*_t - K_0$, where K_0 is the period 0 capital stock and D_t is derived as before, the analysis follows as above.

In this case, even in the long run, in contrast to what "knife-edge" analysis discussed above suggests, the growth rate is invariant to the level of debt, and to economic policy more generally. It is determined only by exogenous changes in technology and factor supplies. However, the recent growth models we turn to next reintroduce reasons why debt has implications for growth.

5. Debt and Growth: "Endogenous Growth" Models

The revival of interest in growth theory in the 1980s, spurred by papers of Romer (1986) and Lucas (1988), suggests a richer relationship between debt and growth. While the literature rests on more neoclassical assumptions about tastes and technology than the "knife-edge" analysis, in some ways it resembles them more than the neoclassical analysis that intervened. In particular, it revives the notion that foreign debt has implications for the long-run growth rate. Unfortunately, the literature is too undeveloped to provide any robust results. Consider the following two models that have very different implications for how changes in world credit market conditions affect growth.

5.1 The Lucas Model

The following analysis draws on Lucas (1988):

Consider an economy with a technology given by:

$$Q_t = K_t^{\beta}(u_t L_t)^{1-\beta} H_t^{1-\beta+\gamma}$$

where Q_t is output, K_t is the capital stock, L_t is the labor force, and H_t represents the state of "technological knowledge" of a typical worker in the economy, all at period t. The variable u_t, which lies between zero and one, represents the share of an average worker's time spent working, rather than developing technological knowledge. (Assume for now that all workers spend the same amount of time working, regardless of their knowledge. We later show

that they will in fact do so.) The capital share is β, which lies between zero and one, and γ is a nonnegative parameter.

A worker's technological knowledge contributes to current output in two ways. First, it increases the productivity of the worker with that knowledge in proportion. Hence worker i with knowledge H_{it} in period t working a fraction of his time u_{it} contributes $u_{it}H_{it}$ to the labor force that period. The worker captures the return to this aspect of his knowledge by earning a proportionately higher wage. Second, if H_t is the average state of knowledge in the economy, output is affected beyond what is implied by the contribution of H_t to the effective labor force in proportion H_t^{γ}. Returns to capital and effective labor exhaust production, so these general returns are not appropriated.

Separating these two roles for technological knowledge, the production relationship can be rewritten:

$$Q_t = K_t^{\beta} E_t^{1-\beta} H_t^{\gamma}$$

where $E_t = u_t H_t L_t$, the effective labor force. The wage (per unit of effective labor) is thus:

$$w_t = (1-\beta)[K_t/(u_t H_t L_t)]^{\beta} H_t^{\gamma}$$

There is only one produced good, which can be used for investment or for consumption. (Issues concerning the relative price of capital are thus not addressed: The price is one.) Hence the capital stock grows according to the relationship $\dot{K}_t = I_t - \delta K_t$, where, again, δ is the rate of depreciation (assumed constant).

Workers inherit a given state of technological knowhow. They can add to the existing state by allocating time toward that purpose, which takes away from their efforts toward current production. The increase in the state of technical knowhow in period t is given by the function:

$$\dot{H}_t = \epsilon H_t(1-u_t)$$

where ϵ is some nonnegative parameter. Note that a given amount of effort at acquiring new knowledge makes a contribution that is proportional to the existing stock of knowledge in period t. Hence $g_H = \dot{H}_t/H_t$, the growth rate in the stock of knowledge, is:

$$g_H = \epsilon(1-u_t).$$

Aside, then, from the two contributions that knowhow makes to production that have already been mentioned (augmenting the current effective labor force in production and enhancing current productivity generally) knowledge increases the productivity of time spent adding to technological knowledge (learning).

Each period t the representative individual chooses a level of consumption c_t and an allocation of time between work and learning u_t. The standard assumption is that preferences are intertemporally additively separable and display constant relative risk aversion. Denoting the discount factor by ρ and the elasticity of the marginal utility of consumption by σ, at any period 0 the individual's problem (taking into account the growth of his household) is to choose c_t and u_t each period to maximize:

$$\int_0^{\infty} \exp(-\rho t) \frac{c_t^{1-\sigma}}{1-\sigma} L_t dt$$

subject to the equation of motion for wealth W_t:

$$\dot{W}_t = rW_t + w_t u_t H_t L_t - c_t L_t,$$

where r is the interest rate (again treated as constant) and w_t the wage per unit of effective labor, and the equation of motion for an individual's state of knowledge:

$$\dot{H}_t = H_t \epsilon (1-u_t).$$

To examine the role of foreign capital consider two versions of the model, one in which all capital investment is financed by national saving (financial autarky) and another in which the capital market is open internationally, so that the economy we examine can borrow or lend at a given constant world interest rate r.

As does Lucas (1988), I focus on a balanced growth path or steady state, in which output and the capital stock grow at the same rate g. In a competitive equilibrium, both under financial autarky and with foreign borrowing, if $\gamma > 0$ then the stock of knowledge grows at g_H, where

$$g_H = \frac{1-\beta}{\gamma}(r-\epsilon-n)$$

if this rate lies below the maximum feasible rate ϵ. Here, as before $n = \dot{L}/L$, the rate of growth of the labor force (again assumed constant). If $\gamma = 0$ or

if $g_H > \epsilon$ the economy achieves a steady state in which the stock of human capital is constant, so that the economy reaches a point after which $u = 1$. There is no further growth growth in output or wages. (A no-growth outcome can also occur whenever $\epsilon < r$, although positive steady-state growth may also be a possibility.)

If a strictly positive growth rate is feasible, however, output and the capital stock grow at:

$$g = \frac{1-\beta+\gamma}{1-\beta} g_H$$

while the wage rate grows at:

$$g_W = r-\epsilon-n$$

Somewhat surprisingly, as long as strictly positive steady-state growth is feasible, the interest rate r affects growth positively while the productivity of time spent acquiring knowledge ϵ affects growth negatively. The reason is that when future income is discounted more and when time spent developing knowledge is less productive, more growth in wages is needed to compensate workers for investing in developing knowledge. Less paradoxically, if the interest rate exceeds a level $\bar{r}$, where

$$\bar{r} = n + \frac{1-\beta+\gamma}{1-\beta}\epsilon.$$

strictly positive steady-state growth is no longer viable. Instead, the steady-state outcome is no growth.

Say, for example, that the labor force grows at an annual rate of 2 per

cent while the maximum feasible steady state growth in technology (ϵ) is 6 per cent, and $\beta = \gamma = 1/3$. Ongoing growth requires an interest rate below 11 per cent.

If the interest rate is in fact 10 per cent then technological knowledge grows at 4 per cent while output and the capital stock grow at 6 per cent. The wage grows at 2 per cent.

A Closed Economy

If the economy has no access to foreign capital, so that the accumulation of domestic physical capital is fully financed through domestic savings, then the steady-state interest rate is r^c, where:

$$r^c = \rho + \sigma g_c$$

and where g_c is the growth rate in per worker consumption, which, with balanced growth, is equal to g-n. Substituting this term into the expression for g_H above gives, as the growth rate in knowledge:

$$g_H^c = \frac{1-\beta}{\gamma-\sigma(1-\beta+\gamma)}[\rho-\epsilon-(1+\sigma)n].$$

Say that the degree of relative risk aversion is 1. (Empirical estimates for most economies place it between one and three.) The growth rate in knowledge is then $2n+\epsilon-\rho$. Because of their effect on the interest rate, population growth and the productivity of time spent acquiring new technology now enhance growth, while discounting reduces it. The feasibility of positive growth now requires that the discount factor not exceed twice the rate of

labor force growth.

An Open Economy

Say instead that the economy can borrow and lend at a constant world interest rate r. In this case individuals' decisions about investment in human capital are independent of their own preferences, in our case of the parameters ρ and σ. The rate of growth depends only on the technological parameters and the world interest rate. Access to the world capital market can raise the growth rate (1) if domestic taste parameters are such that positive growth is feasible with borrowing but infeasible under autarky or (2) if the steady-state growth rate under autarky is positive but below that under free capital mobility.

5.2 The Cohen Model

Cohen (1991) develops an alternative, somewhat simpler discrete-time endogenous growth model that is more in keeping with the assumptions of the two-gap literature. In particular, output is proportional to the capital stock. Hence, in period t, $Q_t = \alpha K_t$, where α is an exogenous constant. The capital stock evolves according to the law of motion:

$$K_t = (1-\delta)K_{t-1} + I_t$$

where, again, δ is the rate at which capital depreciates. Following assumptions that appear in an earlier investment literature, Cohen assumes that investment uses resources beyond what is needed to contribute to the

capital stock. In particular, adding an amount I_t (gross of depreciation) requires a sacrifice of current resources of J_t, where:

$$J_t = I_t[1+(\phi/2)(I_t/K_t)] \ .$$

The parameter ϕ is meant to capture capital installation costs.

As in the Lucas model, the competitive equilibrium of an open economy facing a given world interest rate will entail the maximization of the present discounted value of output at world prices. The consequent growth rate of output g^o is given by:

$$g^o = r - \sqrt{(\delta+r)^2-4(\alpha-r-\delta)/\phi}.$$

The expression for the growth rate of a closed economy with a representative agent with strictly concave preferences is more complicated. Since general results are hard to come by, I provide some numerical calculations. Table 1 presents the growth rates for the open and closed economies under alternative parameter values for α, the discount factor β, r, δ, and ϕ. In order to maintain more or less comparable discount factors for the closed and open cases, β is set equal to 1/(1+r) (although, as with the Lucas analysis, if consumption is growing then the interest rate will exceed the discount rate).

Note that, in contrast with the Lucas model, the growth rate of the open Cohen economy <u>falls</u> when the interest rate goes up. This is simply because a higher world interest rate makes it less worthwhile to allocate resources toward future rather than toward current consumption, while higher growth does not increase the return to investment in physical capital. In the Lucas

model, on the other hand, higher growth increases the return to human capital. Hence higher growth is needed to offset the effect of a higher interest rate, which reduces the incentive to accumulate human capital.

Also not surprising is the result that growth is higher when capital is more productive and is lower the higher the depreciation rate and the cost of installation, as reflected in the parameter ϕ. Note that the open economy grows as fast or faster than the closed economy when both grow at positive rates, but grows as slow or slower when both rates are negative. Whatever tendency of motion the economy has, its direction is exaggerated by openness.

To conclude, both the Cohen and Lucas models, as well as a number of other treatments of endogenous growth, provide a means of relating foreign indebtedness to long-run growth. Unfortunately, at this stage the literature has not provided any general conclusions about such essential issues as the relationship between the world interest rate and the growth rate.

TABLE 1

alpha	beta	r	delta	phi	open	closed
0.60	0.95	0.05	0.05	100.00	0.05	0.01
0.60	0.94	0.06	0.05	100.00	0.01	0.00
0.60	0.93	0.07	0.05	100.00	0.00	-0.00
0.60	0.92	0.08	0.05	100.00	-0.01	-0.00
0.60	0.92	0.09	0.05	100.00	-0.01	-0.01
0.60	0.91	0.10	0.05	100.00	-0.02	-0.01
0.60	0.90	0.11	0.05	100.00	-0.02	-0.01
0.60	0.89	0.12	0.05	100.00	-0.02	-0.02
0.60	0.88	0.13	0.05	100.00	-0.02	-0.02
0.60	0.88	0.14	0.05	100.00	-0.03	-0.02
0.60	0.87	0.15	0.05	100.00	-0.03	-0.02
1.00	0.95	0.05	0.05	100.00	ERR	0.04
1.00	0.94	0.06	0.05	100.00	ERR	0.03
1.00	0.93	0.07	0.05	100.00	ERR	0.03
1.00	0.92	0.08	0.05	100.00	ERR	0.02
1.00	0.92	0.09	0.05	100.00	0.04	0.02
1.00	0.91	0.10	0.05	100.00	0.03	0.01
1.00	0.90	0.11	0.05	100.00	0.02	0.01
1.00	0.89	0.12	0.05	100.00	0.01	0.01
1.00	0.88	0.13	0.05	100.00	0.00	0.00
1.00	0.88	0.14	0.05	100.00	-0.00	-0.00
0.60	0.91	0.10	0.10	100.00	-0.08	-0.06
0.60	0.91	0.10	0.05	200.00	-0.03	-0.03
1.00	0.91	0.10	0.10	100.00	-0.05	-0.04
1.00	0.91	0.10	0.05	200.00	-0.02	-0.01

THE COHEN MODEL: GROWTH RATES UNDER ALTERNATIVE PARAMETER VALUES

6. Sovereign Risk

All the analysis so far rests on an assumption that sovereign debtors will meet debt service obligations to foreign creditors as long as they remain solvent, meaning that debt obligations do not exceed the present discounted value of national resources. There are reasons why sovereign debt may pose problems before the solvency constraint bites, however.

The Public Finance Problem

An issue in the case of sovereign debt is the solvency of the sovereign government itself, as opposed to that of the nation as a whole. Even if the government perfectly represents the interests of the population, the administrative cost and excess burden of taxation can reduce the resources that a government can obtain to meet a debt-service obligation below what is available nationally. The problem debtor countries do in fact seem to have particular difficulty raising tax revenue. The capital flight phenomenon suggests the extent to which a significant portion of nationally-owned resources may lie beyond the grasp of a sovereign debtor.

In fact, depending on how debt-service obligations are financed, even a small amount of debt can, in some circumstances, have a devastating effect on investment and government revenue. To make the argument in its starkest terms, consider a government that relies on proportional taxation of capital income for all of its tax revenue. Hence $T = tg(K)$, where T is tax revenue, t is the tax rate on income from investment, which is itself a function g(K) of the amount invested K; g is increasing and concave in K.

Say that the government owes an amount D to foreign creditors, and D must be covered by tax revenue. Potential investors know that the government owes D, and can invest their funds elsewhere and earn a return r^W. Investing in the debtor country earns them an after-tax return $r^H = (1-t)g'(K)$. Investors must decide where to invest before the actual tax rate is known. (It does not matter for our purposes whether these potential investors are nationals or foreigners; all that matters is that investment income in the debtor country is taxed while foreign investment income is not.) In order to meet its debt-service obligations the government sets a tax-rate $t = D/g(K)$. Hence the after-tax rate of return is

$$r^H(K) = [1-\frac{D}{g(K)}]g'(K),$$

which can be increasing in K for K near zero but decreases in K once K becomes very large. If we assume that individual investors are small relative to the total number (so that each investor ignores the effect of his own investment on the total amount K) investment will occur up to the point at which $r^H(K) = r^W$ if K is strictly positive, while if

$$[1-D/g(0)]g'(0) < r^W \qquad (6.1)$$

then $K = 0$ is an equilibrium outcome. The reason is that the income from any investment by a single, small investor acting on his own will be taxed at a very high rate, since the tax base will be so small.

Figure 1 illustrates a quite possible relationship between $r^H(K)$, K and r^W. At K^*, $[1-D/g(K^*)]g'(K^*) = r^W$. Investment is sufficient to allow a competitive after-tax return even after enough is collected to repay the debt.

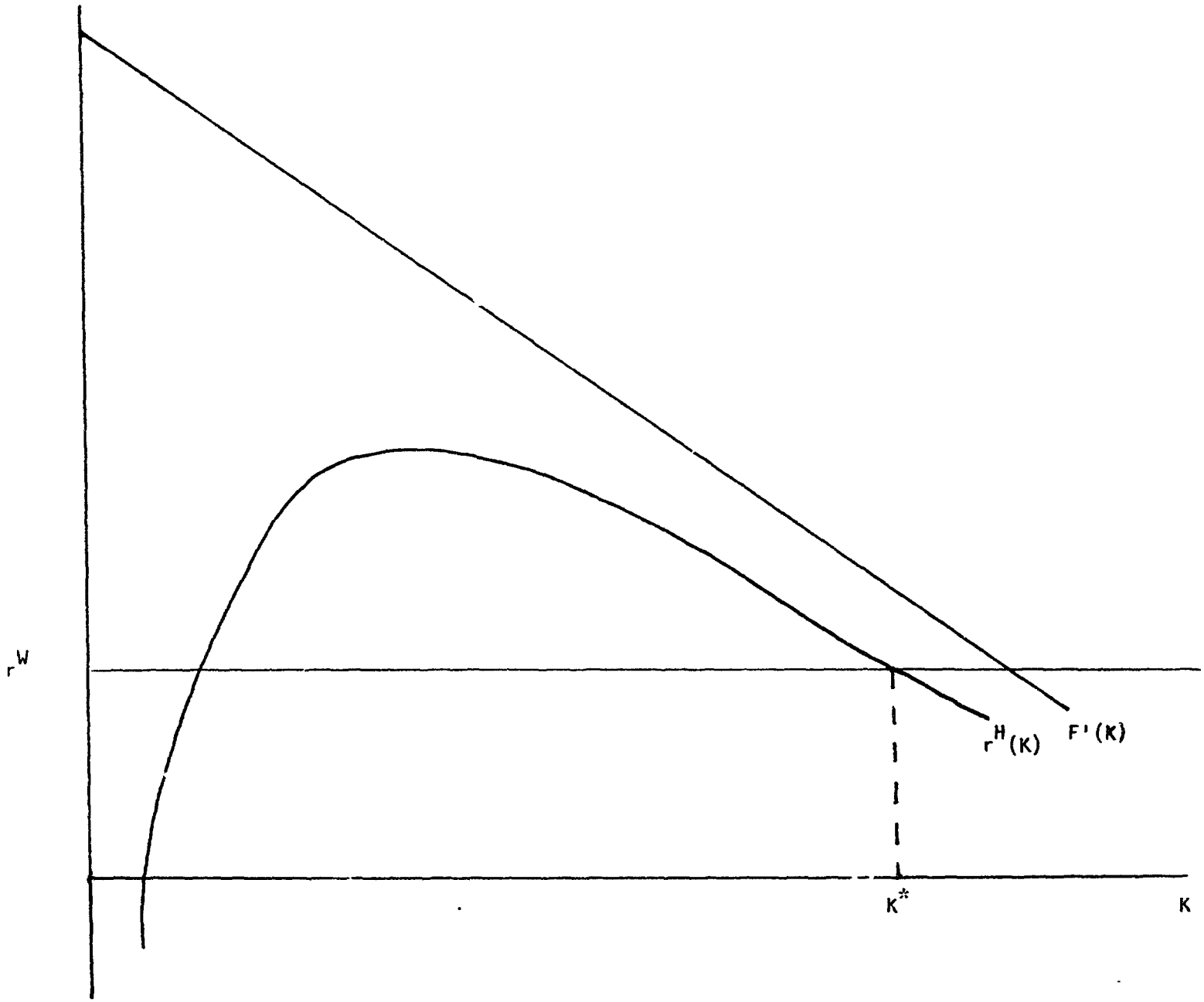

FIGURE 1

(Also, at K*, $r^H(K)$ is declining in K so that K^* is locally stable.) However, condition (6.1) is also satisfied. When the initial amount of capital is zero, a small level of investment is taxed at such a high rate it is not worth making.

The model, which is developed further in Eaton (1987), illustrates several points:

First, it suggests why debt might be associated with capital flight, as domestic investors invest elsewhere to avoid the tax obligations associated with debt. Note that K* could exceed D, so that the equilibrium with positive investment could involve a positive net resource transfer, while the equilibrium with no investment would involve a negative one.

Second, it suggests that governments with large debt obligations would do better to rely on taxes that fall on internationally immobile factors, like land.

Third, it suggests why a government could benefit from being able to commit itself somehow to a particular tax rate in advance of investment decisions.

Why, given the public finance problems associated with sovereign borrowing, was so much borrowing done by governments rather than by private entities? There are probably many reasons. But given the nature of contract enforcement and bankruptcy procedures in many debtor countries, lending to private borrowers would not have avoided problems associated with sovereign risk. Lenders would have had to rely on the borrower's government to enforce loan contracts and to administer bankruptcy procedures fairly. In fact, much of what was borrowed privately was ultimately assumed by borrower governments, even when loans were not guaranteed by the borrower's government.

Diaz-Alejandro (1984) tells of private Chilean banks that borrowed

substantial amounts from foreign commercial banks. The loans were not guaranteed by the Chilean government. The Chilean banks invested the funds quite recklessly, and ultimately went bankrupt. The foreign commercial banks persuaded the Chilean government to assume the liabilities, threatening to worsen the government's own credit terms if it didn't. The point seems to be that the foreign commercial banks did not distinguish between private borrowers in Chile and the Chilean government, and held the government responsible for the outcome of all of its investments there.

The Liquidity Problem

Another problem that is frequently mentioned in discussion of debt repayment is that of liquidity: A sovereign debtor may be solvent, but not have resources available to meet a current debt-service obligation. If the borrower is truly creditworthy, however, the question arises as to why creditors won't lend what is needed to meet the current obligation. This issue comes up in our discussion of the options facing a creditor in dealing with a debtor not paying what it owes in section 8.

The Enforcement Problem

Most domestic borrowing occurs in a context in which creditors have significant legal rights over the assets of debtors. In the case of secured debt, specific assets that the creditor can seize in the event of default serve as collateral. In the case of unsecured debt, a default can lead to the general liquidation of the debtor's assets, with the proceeds distributed to creditors. In either case, the transfer of assets from debtor to creditor in

the event of nonpayment serves the dual purpose of placing a lower bound on what the creditor can recover if default does occur, and providing an incentive for the debtor not to default in the first place.

If in fact creditors can seize all of the debtor's assets, and can realize a return on them that is at least as high as what the debtor could, then the lenders can issue up to the discounted present value of the debtor's income without risk. The solvency constraint is thus the relevant upper bound on what can safely be lent.

In the context of sovereign debt, however, a creditor's legal remedies do not usually provide him the means to obtain a significant portion of the debtor's assets. The creditor might be able to use its own legal system to obtain the debtor's foreign assets, but to the extent that the debtor is a net debtor, these will not suffice to compensate lenders. The natural question then is what incentive a sovereign debtor has to repay any (net) debt since it does not stand to lose assets of comparable value in the event of default.

Answers to this question are the topic of Section 7. First, however, some implications of the enforcement problem deserve mention.

Credit Rationing and the Monitoring of Indebtedness

A creditor's inability to enforce aspects of loan contracts has several implications for the relationship between creditors and debtors, which I illustrate in a simple, two-period framework.

Say that in the first period a debtor borrows some amount L, incurring a debt service obligation $D = L(1+r)$ in the second period. Here r, of course, is the interest rate on the loan.

Say that payment of anything less than what is owed causes the debtor to

suffer a penalty equivalent to the loss of an amount P of income in period 2. Hence the debtor will pay all that it owes if $D \leq P$, and default if $D > P$. (For simplicity, I resolve indifference on the debtor's part in favor of the creditor.) Creditors, who realize this and can monitor total indebtedness, will ensure that $L(1+r)$ does not exceed P. As long as indebtedness satisfies this constraint, loans are perfectly safe, and competitive lenders should provide them at the safe world interest rate r^W.

However, the debtor may want to borrow more than $P/(1+r^W)$ at this rate. But if it does it will default the next period. Lenders will therefore constrain loans not to exceed this amount. The consequence is credit rationing: competitive lenders provide less than what the debtor wants to borrow at the interest rate they charge. The interest rate does not rise in response to this excess demand because total indebtedness in the next period would then exceed P, ensuring default. No risk premium could compensate lenders for certain default.

Credit rationing requires that creditors know the debtor's total debt. In this simple example, if they were ignorant of it, there could be no competitive lending at all. If there were, the debtor would borrow more than what it would be willing to repay and then default. Knowing this, no one would lend.

This result points to the role of accurate information about the stock of total indebtedness in sovereign debt. In this situation the debtor benefits from public observability of its total indebtedness. If its level of debt could not be observed, it could not borrow.

Lack of information need not close the loan market entirely. Following Kletzer (1985), say that the cost of default is nearly infinite with some probability π and $P < \infty$ with probability $1-\pi$. A loan requiring repayment of

P or less is then perfectly safe, since it will be repaid in any event, while a loan requiring repayment of more than this amount will be repaid only with probability π (when the cost of default is very high). If indebtedness is unobservable then risk-neutral lenders will charge an interest rate $r^U = (1-\pi+r^W)/\pi$ to compensate for the risk of default. But, as Kletzer (1985) shows, if debt is observable the debtor may prefer to have loans rationed at $P/(1+r)$ in order to benefit from improved credit terms.

7. The Incentive to Repay

A common assumption is that default on a current debt-service obligation will prevent a borrower from obtaining new credit, at least in the current period. But losing access to current credit provides an incentive to meet a current debt-service obligation if and only if potential new lending exceeds current debt-service obligations, so that the debtor receives a net resource transfer from creditors if it repays, but would receive nothing if it did not.

As discussed in section 3, however, creditors can earn a competitive return on sovereign lending only if the debtor at some point makes net resource transfers to its creditors. As the data in the Appendix show, sovereign debtors have in fact made large net resource transfers to their creditors during the 1980s. The question then, is why sovereign debtors make net resource transfers to their creditors.

7.1 Sanctions

Much of the literature on sovereign debt has simply asserted that the debtor suffers some exogenously-specified penalty beyond the loss of current new lending if it defaults. A particular justification for this assumption is that default allows creditors to intercept payments that the debtor might make to foreign exporters, or payments that it might receive from foreign importers. The cost of evading the creditor's attempts to intercept these payments (through barter arrangements, for example) would reduce the debtor's gains from trade.

Say that this penalty causes the debtor to incur a loss with a value in

terms of its permanent income of P if it defaults. If, subsequent to the default, the borrower can resume transacting at the world interest rate then the desirability of default depends on a comparison of the discounted value of net resource transfers to current creditors associated with the debt, which should correspond to the current value of the debt itself, and the cost of the penalty.

A common assumption is that P depends positively upon the debtor's subsequent income. Why it should is not clear. If default leads to a deterioration in the terms of trade then the argument must be made that the gains from trade increase with income. There is no presumption that they do. Growth in income might be "import biased," for example, so that higher income implies less reliance on foreign trade.[3] Nevertheless, the assumption that the cost of default, and hence how much foreign creditors can extract from a sovereign debtor, is central to a number of major results on debt forgiveness and debt buybacks, the topics of sections 8 and 9.

7.2 Maintaining a Reputation for Repayment

Another reason why a debtor might choose to repay debt is to maintain access to foreign credit markets on favorable terms. Historically, widespread default on loans to developing countries has lead to a subsequent loss of access to credit markets. Episodes of widespread default among Latin American debtors was followed by a virtual loss of access to credit markets for these countries. Subsequent to a series of defaults in the 1930s, for example, Latin American countries were unable to raise money from private international capital markets until the 1970s.

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[3]See the discussion in Gersovitz (1983).

There is, however, disagreement about the extent to which an individual developing country's repayment performances affected its credit terms relative to those of developing countries as a whole. Hence it is not clear to what extent creditors distinguished among individual countries in relating credit terms to past performance, or judged developing countries as a group. Eichengreen and Portes (1990) indicate that, during the 1920s and 1930s, credit terms did reflect previous repayment within that period, but that a record of default in the 1930s did not worsen credit availability in the 1970s. Ozler (1989a), on the other hand, using a sample that excludes countries that did not exist in the 1930s, finds that among countries that existed in both periods, a history of successful repayment in the 1930s improved credit terms in the 1970s. Furthermore, Ozler (1989b) finds that a history of successful repayment within the 1970s improved subsequent credit terms within the period. Nevertheless, even if creditors lump developing countries together in assessing their creditworthiness, a loss of access to foreign credit markets can serve as an incentive for an individual debtor to repay. Group treatment of developing country debtors by creditors simply introduces a negative externality to a country's default decision.

As Bulow and Rogoff (1989b) have emphasized, losing access to loans from foreign credit markets does not suffice, by itself, to serve as an incentive to repay. If a sovereign debtor in default can somehow continue to enforce its own loan contracts with its own foreign debtors at the world interest rate then, if the only consequence of default is inability to borrow again, at some point a debtor will be called upon to transfer so much to its creditors that it would prefer to default and invest what it owes on its own account. From then on it can remain a net creditor and do at least as well as it could have if it repaid and borrowed again.

The question arises as to why a sovereign debtor in default could itself enforce a loan contract. The discussion up through section 5 implicitly assumed two-sided automatic enforcement, that the country in question will repay its debts as along as it has the resources to do so, and could rest assured that the rest of the world would repay any loans it made. Other literature (e.g., Eaton and Gersovitz, 1981, Grossman and van Huyck, 1988) implicitly assumes no automatic enforcement: Any credit arrangement would be honored only as long as credit arrangements had always been honored in the past. Kletzer and Wright (1990) have shown that, as long as all parties to any credit arrangement face (even temporary) exclusion from credit markets as a consequence of default then positive amounts of borrowing and lending can be sustained. Bulow and Rogoff's contribution is to show that reputation alone will not sustain lending if there is one-sided automatic enforcement in the credit market.

The result has been misinterpreted, however, to mean that a threatened loss of access to international credit markets in general (financial autarky) is insufficient to sustain borrowing and repayment. See, for example, Cohen (1991, p. 94). Sustaining nonzero net transfers requires, however, that at no point in the relationship between the borrower and lenders is it certain that subsequent net resource transfers from one to the other will be in just one direction.

The following model illustrates how the threat of financial autarky can sustain some transfer of resources between a borrower and the rest of the world.

For simplicity, consider the simple economy treated in Section 4 with an exogenous output Q_t each period t facing a constant world interest rate r. At any period t its utility is given by $u(C_t)$ where C_t is period t consumption.

the function u is increasing and concave. The country's discount factor is $\beta < 1/(1+r)$. Its present discounted value utility U_t at any time t is thus:

$$U_t = \sum_{\tau=t}^{\infty} \beta^{\tau-t} u(C_\tau) \ . \tag{7.1}$$

The country's debt evolves according to the equation:

$$D_{t+1} = D_t(1+r) + NT_t \ .$$

Net resource transfers $NT_t = C_t - Q_t$ are subject to the solvency constraint:

$$\sum_{t=0}^{\infty} \frac{NT_t}{(1+r)^t} \geq 0 \ . \tag{7.2}$$

So far, all is just as in section 4. In addition, however, the enforcement constraint requires that, at any time, maintaining its relationship with the international financial community is at least as advantageous as severing its ties (by failing to make a net resource transfer that is expected of it), and enduring financial autarky thereafter, consuming its endowment. Hence, at each period t it must be the case that the consumption path C_τ provided by participation in world financial markets satisfies:

$$\sum_{\tau=t}^{\infty} \beta^{\tau-t} u(C_\tau) \geq \sum_{\tau=t}^{\infty} \beta^{\tau-t} u(Q_\tau); \quad t = 0,\ldots,\infty \ . \tag{7.3}$$

Sensible creditors will restrict the debtor to debt and repayment profiles that satisfy not only the solvency constraint (7.2) but the

enforcement constraints (7.3) as well. The debtor's problem is thus to maximize (7.1) subject to (7.2) and (7.3). The relevant optimization problem is now given by the Lagrangian:

$$\max_{C_t} \{ \sum_{t=0}^{\infty} \beta^t u(C_t) + \mu_t \sum_{\tau=t}^{\infty} \beta^\tau [u(C_\tau) - u(Q_\tau)] + \lambda(\frac{Q_t - C_t}{(1+r)^t}) \} \qquad (7.4)$$

where λ is again the Lagrange multiplier associated with the solvency constraint (7.2) while μ_t are the (undiscounted) Lagrange multipliers associated with the enforcement constraints (7.3).

The first-order conditions for a maximum are now:

$$[(1+r)\beta]^t u'(C_t)(1 + \sum_{\tau=0}^{t} \mu_\tau) = \lambda; \quad t = 0, \ldots, \infty.$$

Raising consumption in any period not only contributes to utility directly but contributes toward relaxing the enforcement constraints of the current and prior periods.

Say that $u(C_t) = \log(C_t)$, $(1+r)\beta < 1$, and $Q_t = Q^L$ if t is even while $Q_t = Q^H$ if t is odd, where $Q^H > Q^L > 0$. Hence income fluctuates between a high and low value. Since consumption is subject to declining marginal utility, the country has an interest in maintaining access to the world capital market to smooth consumption.

From the perspective of any period in which income is low, the present value of future resources discounted at the world interest rate is:

$$W_0 = \frac{(1+r)[(1+r)Q^L + Q^H]}{r(2+r)} .$$

In the absence of any enforcement problem the optimal consumption profile satisfies:

$$C_t^* = [(1+r)\beta]^t(1-\beta)W_0 \ .$$

The assumption that $\beta < 1+r$ implies that, absent any enforcement constraint, consumption would diminish over time, approaching zero as t becomes large. Since the country is more impatient than world capital markets, it exchanges present for future consumption.

At some critical point t*, then, it would be the case that the $C_t^* < Q^L$ for all $t \geq t^*$. From that point on the optimal borrowing program would call upon the country to make net resource transfers to creditors every period. Obviously the country would do better to default on its debt and consume its endowment thereafter. Hence the enforcement constraint must affect the consumption path. How much borrowing can still occur?

If $Q^L \geq (1+r)\beta Q^H$ then the consumption smoothing motive to maintain creditworthiness is not enough to sustain any borrowing at all: The anticipated decline in output is not sufficient to provide an incentive to repay debt in good times in order to borrow in bad times. Otherwise, however, a debtor will be willing to make a positive net resource transfer to creditors when output is high in order to borrow again when output is low.

As in the unconstrained program, initially the debtor borrows in order to raise current consumption. At some point, however, debt reaches a level at which the borrower is indifferent between maintaining access to the international capital markets and defaulting. From that point onward, debt can no longer increase over time. Instead, when output is low the debtor

receives a net resource transfer from its creditors but makes a net resource transfer back when output is high. In high output periods the debtor is indifferent between repaying and defaulting, but in low output periods (when it receives a net resource transfer from creditors) it is strictly better off than under financial autarky.

Once the enforcement constraint binds, it binds in every high output period thereafter, and the level of debt is the same in each subsequent high output period. How large the maximum debt level can be depends on the present value of the net resource transfer over the cycle that the debtor is prepared to make in order to avoid financial autarky.

Tables 2A and 2B provide magnitudes of indebtedness and net transfers (2A for the case in which output cycles between 8 and 12, a 20 per cent standard deviation, and 2B for the case in which it cycles between 9 and 11, a 10 per cent standard deviation) for various values of β ("beta"), and R = 1+r; CH and CL are consumption levels when output is high and low, respectively, while QH-CH and QL-CL are the corresponding net resource transfers from debtor to creditor. (The first is always positive and the second always negative.). The maximum amount of debt at the beginning of a high output period is given in the column DMAX.

The final column compares DMAX with the value of debt incurred in the previous (low-output) period times R. If the difference is positive then the debtor in fact can borrow enough before the enforcement constraint becomes binding to remain a net debtor thereafter. Otherwise, the enforcement constraint binds immediately and the debtor cannot initially borrow enough to remain a net debtor over the cycle. Instead, it can only borrow DMAX/R when output is low. The net transfer it then makes to creditors when output is high not only fully repays debt but includes, in addition, a net investment to

finance consumption when output is again low.

The tables reveal several relationships: How much debt can be sustained depends positively on the variability of output and the discount factor, and negatively on the interest rate. Moreover, the effect of output variability is dramatic: An order of magnitude more debt relative to average income can be sustained when output fluctuations are 20 per cent rather than 10 per cent. Also notable is the sensitivity of the maximum debt level to the interest rate.

Finally, note that increases in β offset by reductions in R that maintain $R\beta$ constant increase the maximum sustainable debt level. An interpretation is that high frequency fluctuations (say, over the season) allow for more debt to be accumulated than low frequency fluctuations (say over the business cycle).

The analysis is simple. For example, there are no allowances for uncertainty, growth, and investment. Introducing these factors will not affect the basic point of the exercise, that maintaining access to credit markets is a sufficient reason to service debt.

In fact, domestic investment opportunities provide an additional reason to want to maintain access to credit markets. The expected return on investment opportunities may also fluctuate. If a country must finance its own investment, taking advantage of investment opportunities may then force consumption to fluctuate. Access to international capital markets allows it to vary its investment level in response to changes in domestic opportunities without completely offsetting movements in consumption.

Annual data on net resource transfers presented in the Appendix indicate that, during the 1970s and 1980s, the direction of flow of funds between debtor countries and international capital markets changed on average around 5

times. Possibly, there was much more variation within the year.[4]

[4]Using a model very similar to the one developed here, Cohen (1991) claims that avoiding financial autarky cannot, by itself, provide an incentive to service debt (p. 94). What he actually shows is that avoiding financial autarky cannot be the reason for making net resource transfers two periods in a row. If it is the reason in the second period then, in that period, the debtor must be indifferent between repayment and autarky. In the previous period, then, making a net resource transfer must bring utility strictly below the autarky level.

TABLE 2A

R=1+r	beta	CH	CL	QH-CH	QL-CL	DMAX	DMAX-R*(CL-QL)
1.001	0.90	10.40	9.37	1.60	-1.37	111.50	110.13
1.005	0.90	10.39	9.39	1.61	-1.39	22.99	21.59
1.010	0.90	10.36	9.42	1.64	-1.42	11.93	10.50
1.020	0.90	10.31	9.47	1.69	-1.47	6.41	4.92
1.030	0.90	10.27	9.52	1.73	-1.52	4.59	3.03
1.040	0.90	10.22	9.56	1.78	-1.56	3.68	2.05
1.050	0.90	10.17	9.61	1.83	-1.61	3.14	1.45
1.060	0.90	10.13	9.66	1.87	-1.66	2.79	1.03
1.070	0.90	10.08	9.71	1.92	-1.71	2.54	0.71
1.080	0.90	10.04	9.76	1.96	-1.76	2.36	0.46
1.090	0.90	9.99	9.80	2.01	-1.80	2.22	0.26
1.100	0.90	9.95	9.85	2.05	-1.85	2.12	0.08
1.001	0.85	10.73	9.13	1.27	-1.13	73.05	71.92
1.005	0.85	10.71	9.15	1.29	-1.15	15.15	14.00
1.010	0.85	10.68	9.17	1.32	-1.17	7.92	6.74
1.020	0.85	10.64	9.22	1.36	-1.22	4.32	3.07
1.030	0.85	10.59	9.27	1.41	-1.27	3.13	1.82
1.040	0.85	10.54	9.32	1.46	-1.32	2.54	1.17
1.050	0.85	10.49	9.37	1.51	-1.37	2.19	0.76
1.060	0.85	10.45	9.41	1.55	-1.41	1.97	0.47
1.070	0.85	10.40	9.46	1.60	-1.46	1.81	0.25
1.080	0.85	10.36	9.51	1.64	-1.51	1.70	0.07
1.090	0.85	10.32	9.56	1.68	-1.56	1.61	-0.09
1.100	0.85	10.27	9.60	1.73	-1.60	1.55	-0.22
1.110	0.85	10.23	9.65	1.77	-1.65	1.49	-0.34
1.120	0.85	10.19	9.70	1.81	-1.70	1.45	-0.45
1.130	0.85	10.15	9.75	1.85	-1.75	1.42	-0.55
1.140	0.85	10.11	9.79	1.89	-1.79	1.40	-0.64
1.150	0.85	10.07	9.84	1.93	-1.84	1.38	-0.74
1.001	0.95	10.09	9.60	1.91	-1.60	155.24	153.64
1.005	0.95	10.07	9.62	1.93	-1.62	31.88	30.25
1.010	0.95	10.05	9.64	1.95	-1.64	16.47	14.81
1.020	0.95	10.00	9.69	2.00	-1.69	8.77	7.05
1.030	0.95	9.95	9.74	2.05	-1.74	6.22	4.43
1.040	0.95	9.91	9.79	2.09	-1.79	4.95	3.09
1.050	0.95	9.86	9.84	2.14	-1.84	4.20	2.27

MAXIMUM DEBT LEVELS SUSTAINABLE THROUGH "REPUTATION" QH = 12, QL = 8

TABLE 2B

R=1+r	beta	CH	CL	QH-CH	QL-CL	DMAX	DMAX-R*(CL-QL)
1.001	0.90	10.51	9.47	0.49	-0.47	11.54	11.08
1.005	0.90	10.49	9.49	0.51	-0.49	2.51	2.02
1.010	0.90	10.46	9.51	0.54	-0.51	1.39	0.87
1.020	0.90	10.42	9.56	0.58	-0.56	0.84	0.27
1.030	0.90	10.37	9.61	0.63	-0.61	0.67	0.04
1.040	0.90	10.32	9.66	0.68	-0.66	0.59	-0.10
1.050	0.90	10.27	9.71	0.73	-0.71	0.54	-0.20
1.060	0.90	10.23	9.76	0.77	-0.76	0.52	-0.28
1.070	0.90	10.18	9.81	0.82	-0.81	0.50	-0.36
1.080	0.90	10.14	9.85	0.86	-0.85	0.50	-0.42
1.090	0.90	10.09	9.90	0.91	-0.90	0.50	-0.49
1.100	0.90	10.05	9.95	0.95	-0.95	0.50	-0.55
1.001	0.85	10.80	9.19	0.20	-0.19	1.90	1.71
1.005	0.85	10.78	9.21	0.22	-0.21	0.46	0.25
1.010	0.85	10.76	9.24	0.24	-0.24	0.29	0.05
1.020	0.85	10.71	9.29	0.29	-0.29	0.21	-0.08
1.030	0.85	10.66	9.34	0.34	-0.34	0.20	-0.15
1.040	0.85	10.62	9.38	0.38	-0.38	0.19	-0.21
1.050	0.85	10.57	9.43	0.43	-0.43	0.20	-0.26
1.060	0.85	10.52	9.48	0.48	-0.48	0.20	-0.31
1.070	0.85	10.48	9.53	0.52	-0.53	0.21	-0.35
1.080	0.85	10.43	9.58	0.57	-0.58	0.22	-0.40
1.090	0.85	10.39	9.63	0.61	-0.63	0.23	-0.45
1.100	0.85	10.35	9.67	0.65	-0.67	0.24	-0.50
1.110	0.85	10.30	9.72	0.70	-0.72	0.25	-0.55
1.120	0.85	10.26	9.77	0.74	-0.77	0.27	-0.59
1.130	0.85	10.22	9.81	0.78	-0.81	0.28	-0.64
1.140	0.85	10.18	9.86	0.82	-0.86	0.29	-0.69
1.150	0.85	10.14	9.91	0.86	-0.91	0.30	-0.74
1.001	0.95	10.22	9.72	0.78	-0.72	28.18	27.45
1.005	0.95	10.20	9.74	0.80	-0.74	5.96	5.22
1.010	0.95	10.18	9.77	0.82	-0.77	3.19	2.42
1.020	0.95	10.13	9.82	0.87	-0.82	1.82	0.99
1.030	0.95	10.08	9.86	0.92	-0.86	1.37	0.48
1.040	0.95	10.03	9.91	0.97	-0.91	1.15	0.20
1.050	0.95	9.99	9.96	1.01	-0.96	1.03	0.02

MAXIMUM DEBT LEVELS SUSTAINABLE THROUGH "REPUTATION" QH = 11, QL = 9

8. Dealing with Nonpayment

If in fact the sanctions that creditors impose on a debtor in default take the form of a trade embargo, rather than a seizure of its assets, the problem arises as to why the creditor community would ever impose sanctions. Bulow and Rogoff (1988b) develop an argument which separates private creditor banks from the rest of the creditor countries. Default gives banks the legal right to seize any assets of any debtor in default in the creditor community, which reduces or eliminates potential gainful trade between the creditor community as a whole and the debtor country. Both lose but the banks either do not suffer or even gain if some trade remains. The banks' legal rights may even allow them to extract some transfers from the creditor country public, who are willing to pay the banks (or give the debtors money to pay the banks) in order to forestall default and maintain trade with the debtor.

A remaining question is why the creditor community protects these creditor rights if it is not in their interest to do so. In fact, legal issues surrounding "state doctrine" suggests that the claims of private creditors could be quite shaky if exercising them is not in the public interest. Alexander (1987) provides a discussion.

The fact that declaring a borrower to be in default may not convey nearly as much benefit to a creditor in an international context, compared with a domestic context, makes the disposition of sovereign debts relatively more difficult to ascertain. In particular, a creditor may be much more willing to finance debt-service obligations with "new money" if declaring default does not convey much in the way of privileges.

Consider the general situation of a creditor confronted with a debtor

that owes more than it is able or willing to transfer. There are four options: (i) lending the difference (which could take the form of rescheduling, tolerating arrears, or providing "new money"); (ii) finding another creditor to lend the difference; (iii) forgiving the difference; or (iv) declaring the borrower in default and seeking a legal remedy.

The following simple example, which draws on several in the literature, illustrates the situation. A debtor with current income Y^1 owes D_1 now and D_2 next period. It only comes up with $R_1 < D_1$ this period, however. There are two possible outcomes in period 2: either the debtor has a high GDP, Y^H, in which case the debtor is for some reason willing to pay whatever is owed, or income is Y^L and the debtor repays $R_2^L < D_2$. (Why the debtor is willing to pay more when income is high than when it is low is not modeled.) The probability $\pi(e)$ that income is high depends positively on the debtor's effort e in period 1, which could, for example, reflect its investment in exportable commodities, fiscal reform, etc. Effort reduces current income.

In period 1, then, the debtor chooses e to maximize:

$$Y_1 - R_1 - e + \pi(e)(Y^H - R_2^H) + [1 - \pi(e)](Y^L - R_2^L)$$

where R_2^H is whatever is owed in period 2.

A unit of effort costs the debtor 1 now and provides it an expected return $\pi'(e)(Y^H - R_2^H - Y^L + R_2^L)$, where $\pi'(e)$ is the increase in the probability of high income from an extra unit of effort. The amount of effort that the debtor will want to undertake to increase the probability of high income is thus a positive function of the difference between income after repayment in the two periods. Hence we can write the equilibrium amount of effort as $e(Y^H - R_2^H - Y^L + R_2^L)$. Most significantly, the amount of effort that the debtor will

want to expend falls as R_2^H rises.

Formal Bankruptcy and Legal Remedies

Consider now the various options available to the creditor, beginning with (iv) a formal declaration of default and subsequent legal remedy. It is not entirely clear, in the context of sovereign debt, what this would mean. But one interpretation of this course of action is that it allows the creditor to take some of the debtor's current assets within territory subject to the jurisdiction of the creditor's legal system. Once the disposition of these assets was adjudicated, however, any remaining claim that the creditor has against the sovereign would be wiped clean.[5]

Say that this course of action yields the creditor an expected net gain G and the creditor an expected direct loss L. Since the period 2 debt is canceled the debtor would then find it worthwhile to expend an amount $e(Y^H-Y^L)$. This is the socially efficient amount, since the debtor recovers all the gains from its effort. All distortion imposed by the debt itself is eliminated. To the extent that L exceeds G, however, bankruptcy itself introduces inefficiency; and there are reasons to think that the inefficiencies associated with sovereign bankruptcy are significant, although we have little direct evidence.

New Money

Consider as the next option (i) lending the difference. The creditor

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[5]It is not the case, as is occasionally claimed, that by setting aside a loan loss reserve or "writing down" a debt a creditor cancels it. Taking these actions does not relinquish any legal rights.

gets R_1 now and increases its period 2 debt by $(D_1-R_1)(1+r^L)$, where r^L is the interest rate on what is rolled over. But this amount is paid if and if $Y = Y^H$. The debtor's period 2 obligation grows to $D_2+(D_1-R_1)(1+r^L)$, so that its optimal level of effort falls to $e[Y^H-D_2+(D_1-R_1)(1+r^L)-Y^L+R_2^L]$. The creditor can expect to get $R_1+\pi(e)[D_2+(D_1-R_1)(1+r^L)] + [1-\pi(e)]R_2^L$ since the creditor pays R_1 now for sure and $D_2+(D_1-R_1)(1+r^L)$ the next period with probability $\pi(e[Y^H-D_2+(D_1-R_1)(1+r^L)-Y_L+R_2^L])$ and R_2^L with remaining probability. Here the debt burden is at its maximum, but if income is high the creditor recovers the most.

Forgiveness

Turn now to option (iii), forgiving the current shortfall. Again the creditor receives R_1 for sure now, but receives D_2, the original obligation, next period with probability $\pi[e(Y^H-D_2-Y^L+R_2^L)]$. Hence the period 2 debt obligation and the consequent amount of effort on the part of the debtor to achieve a high income are somewhere in between what they are in the case of a rollover and a cancellation.[6]

In comparing options (i) and (iii), the creditor trades off the size of the period 2 obligation with the likelihood that the obligation will be paid off. The higher the debt obligation, the less effort the debtor is likely to put into ensuring that circumstances will be such that it will pay.

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[6]Note, by the way, that formally, through the choice of r^L, financing a postponement of repayment includes debt forgiveness ($r^L = -100\%$) and cancellation ($r^L = -D_2/(D_1-R_1)\times 100\%$) as special cases. We are thinking, however, of rollovers as occurring at either the actuarially fair rate or at least at the risk-free rate. A rollover at anything less than the actuarially fair rate involves an element of forgiveness.

The "Debt Laffer Curve" and Debt Relief

The general situation, illustrated by this example, in which an increase in a debtor's debt can actually lower its expected net resource transfers to its creditors (and hence, presumably, the market value of its debt) has been called a "debt Laffer curve." Obviously, zero obligations imply zero transfers and have zero value, so the relationship between the face value and market value of the debt must be nondecreasing over a range. But at some point, the argument goes, the disincentive effects associated with a high nominal debt burden create such a disincentive to bring about conditions for full repayment that more nominal debt means less, on average, will be repaid.

The phenomenon has implications for issues other than what creditors should do about unpaid debt. If, for example, adding to the future debt burden reduces the value of the debt, then it is quite likely that subtracting from it will increase the value of the debt. Regardless of what the debtor pays in period 1, creditors may find it in their collective interest to reduce period 2 debt service obligations below D_2, say to D_2', in order to raise e and, therefore, π.

Note that the possibility of a debt Laffer curve in this example requires that there be at least two possible outcomes that bear the following relationship to each other. In one state the debtor pays less than what it owes, and what it does pay in that state does not increase unit for unit with what it owes. In another state the debtor pays more, and what it does pay strictly increases with what it owes, and the marginal effect of what it owes on what it pays in this state is greater than the effect on what it pays in the state in which it pays less.

More generally, say that in the low income state the debtor pays $R^L(D_2)$ while in the high income state it pays $R^H(D_2)$. Effort as a function of D_2 is then $e[Y^H - Y^L + R^L(D_2) - R^H(D_2)]$. For an increase in debt to decrease e requires that $R^L(D_2)$ rise by strictly less than $R^H(D_2)$ when D_2 rises.

What the creditor can expect to get in period 2 is:

$$\pi(e)R^H(D_2) + [1-\pi(e)]R^L(D_2),$$

so that for an increase in e to raise the expected payment requires that $R^H(D_2) > R^L(D_2)$.

These conditions were all satisfied in our example since $R^H(D_2) = D_2$ and $R^L(D_2) = R_2^L$. They would not be satisfied if, for example, the debtor was expected to pay the same amount regardless of income (if $R^H(D_2) = R^L(D_2) = D_2$) or if whatever it was expected to repay in either state was independent of D_2. The typical assumption is as in the example, that nominal debt affects what a debtor repays only when it repays the full amount. In that case the possibility of a debt Laffer curve requires a belief that there is a significant likelihood that the full amount of the debt will be paid off. Otherwise, the face value of the debt is irrelevant.

Coordination, Free Riders, and New Lenders

A natural question raised by the debt Laffer curve is why, if reducing the face value of a country's debt raises its actual value, don't lenders take advantage of the relationship by forgiving debt, to the point at which its market value is maximized.

One explanation is that reducing the face value requires coordination

among lenders, each of whom benefits from debt relief by others. The explanation is incomplete, however. It would still pay for a single purchaser to buy up all (or at least a major portion) of the outstanding debt, and then reduce the debt. The initial holders might appropriate much of the gain, but an offer contingent on 100 per cent participation would still leave a reward to anyone trying to consolidate the debt and achieve the gain.

Demirguc-Kunt and Diwan (1990) have suggested deposit insurance as a reason for the market's failure to consolidate debt and achieve potential efficiency gains. They distinguish between sound and unsound banks. Unsound banks may actually prefer to hold an asset with a more variable return even if its expected return is lower. The reason is that if the return is low or even average the bank will fail, and bank owners will not suffer the entire loss, but a high return will ensure survival, so that the owners will enjoy the gain. Hence unsound banks may actually consider the debt to be more valuable if it is not written down (since there is some chance of a high return) and may not be willing to sell the debt at its market value to a sound bank. One might ask, then, why unsound banks don't buy all the debt. The answer is that they lack the funds to do so by virtue of their unsoundness.

Proponents of a public buyout of the debt, for instance Kenen (1990) and Sachs (1990), have also made use of the debt Laffer curve argument. The idea is that, since market failures have rendered the private markets incapable of writing-down the debt, a public institution should correct the failure by buying up the debt and realizing the Laffer curve gain itself.

Obviously, the soundness of such an institution hinges on the position of the relevant debtors on the debt Laffer curve. If debtors are on the "wrong" (downward-sloping) side of the curve then the institution could make money, or at least avoid a loss, by realizing the gains from debt relief. If debtors

are on the upward-sloping portion, however, no such efficiency gains exist, and if it buys the debt at anything above market value it will lose, unless, of course, it has some advantage over private creditors in collecting payment. There is little reason to see why it should. Existing public institutions do not seem to have succeeded in achieving net resource transfers from their debtors to the extent that private creditors have. More evidence on this question, however, would be enlightening.

Public involvement in the debt crisis may, however, provide sovereign debtors an option that is rarely available domestically. Consider the remaining response to a recalcitrant debtor, option (ii), finding another lender to lend the difference between what the debtor owes and what it is willing to pay. It is rarely the case that a loan will be worth more to another private lender than it is to the original lender. Nevertheless, public desire to avoid financial disruption and possible inefficiencies associated with default has created pressure for a public takeover of the debt: Already, on an ad hoc basis, official lending agencies have lent problem debtors some of the difference between what they owe and what they want to pay their private creditors. Various proposals for debt relief institutionalize this response.

9. Buybacks and Swaps: Market-Based Debt Reduction Schemes

Various schemes have been proposed, some of which have been implemented, in which debtor countries buy back their debt on the secondary market. The original loan covenants typically prohibit debtor buybacks. Hence overt buybacks require that creditors waive these prohibitions. Debtor governments may nevertheless be able to buyback covertly, through third parties, for example. In fact, creditors have now permitted debtor buybacks in a number of circumstances.

Buybacks have taken several forms;

1. Simple buybacks using the debtor's own resources.

2. Simple buybacks using donated resources.

3. "Swap" arrangements, whereby the government exchanges debt for domestic currency at some stated price. The use of this currency is tied to particular purposes such as direct foreign investment (in the case of debt-equity swaps) or environmental protection (debt-for-nature swaps).

Swaps can be decomposed into a simple buyback with a subsidy to direct foreign investment (in the case of debt-equity swaps) or to environmental protection (in the case of debt-for-nature swaps). The amount of the subsidy depends upon the price at which debt is repurchased and on the exchange rate offered.

Discussion has focused on the buyback component of the scheme, which can be analyzed in isolation from the swap component. A particular controversy surrounds the extent to which buybacks benefit debtors. One claim is that they benefit creditors at the expense of debtors. Another is that they benefit both. I present, in very simple form, examples in which each result

emerges, and discuss the assumptions driving the different outcomes.

9.1 "Average" and "Marginal" Debt: Are Buybacks Boons or Boondoggles?

Bulow and Rogoff (1988a) argue that, in the case of sovereign debt, buybacks out of the debtor's own resources benefit creditors at the expense of debtors, and that creditors appropriate the lion's share of funds donated to a debtor to buy back debt.

Consider a two-period case in which the debtor owes an amount D in period 2. How much it will pay to service any level of debt in period 2 is an amount R that has a probability distribution F(R), which, critically, is independent of D. What it actually will pay is the minimum of R and D, so if R exceeds D it pays its debt in full, while otherwise it pays R and defaults on the rest. (For simplicity, all magnitudes are discounted to period 1 present values.)

Creditors know all this, so they anticipate an expected payment V(D) that is a function of the face value of the debt D:

$$V(D) = \int_0^D R dF(R) + [1-F(D)]D.$$

The first term reflects what creditors get when R is less than D, the realized value of R. The second term is the probability that R exceeds D times repayment in that case, D. Since V(D) is the expected amount of repayment in period 2, if the market is risk-neutral then V(D) should equal the period 1 market value of the debt.

The <u>marginal value</u> of debt is the effect of an increase in one unit of its face value on its market value. Differentiating with respect to D, the

marginal value is:

$$V'(D) = 1\text{-}F(D) + d\left(\int_0^D RdF(R)\right)/dD$$

Since the distribution of R is assumed to be independent of D, this expression reduces to 1-F(D), the probability of full repayment. In this case the only effect of increasing nominal debt by one unit is to increase repayment by one unit <u>if</u> full repayment is made. Otherwise it has no effect.

The <u>average value</u> of a unit of debt p will equal V(D)/D or:

$$p = \int_0^D (R/D)dF(R) + 1\text{-}F(D).$$

This amount corresponds to expected payment per unit of debt. It exceeds 1 - F(D) as long as some payment occurs even if full repayment is not made, but the price cannot exceed one.

When the debtor buys up its own debt, the presumption is that it should pay at least the average price p, since this is the value of the claim that the seller is sacrificing. In fact, buybacks have occurred at prices near or above the market price.[7] To give buybacks the best chance of helping the debtor, I treat the case in which buybacks take place at the market price.

The effect of the buyback on what the debtor pays subsequently is the marginal value V'(D) <u>minus</u> the extent to which resources used for the current buyback (p) reduce what will be available for repayment subsequently. Say that every dollar spent on buybacks reduces funds available for repayment by a

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[7]One finding is that debt bought back through negotiations with creditors costs much more than the market price, while auctions lead to prices close to the market value.

fraction λ. If one unit of debt is bought back at price p then what the debtor is willing to pay for any level of debt falls from R to R - λp.

How a buyback of one unit of debt affects what the debtor ultimately transfers to the creditor thus has three components. First, there is the transfer entailed in the buyback itself, equal to to the average price $p = V(D)/D$. Then there is the consequent change in the face value, which reduces expected repayment by the marginal value of the debt $V'(D) = 1 - F(D)$. Finally, there is the expected reduction in what the debtor will pay when there is incomplete payment, which equals $\lambda F(D)p$, the probability of incomplete payment F(D) times what is spent on the buyback p times the effect of buybacks on resources available for repayment λ. The total effect, then is:

$$\frac{V(D)}{D} - V'(D) - \lambda pF(D) = p - 1 + F(D)(1-\lambda p).$$

Since $1 \geq p \geq 1 - F(D)$, this amount is positive if $\lambda = 0$, as Bulow and Rogoff (1988a) claim is the case for sovereign debt, and negative if $\lambda = 1$, which they consider to be the case for corporate debt.

Hence a crucial issue is how much the buyback reduces what is available for later repayment. If future resources are significantly reduced, (λ near one) then the buyback is a boon for the debtor. A unit of debt reduction costs p. But it reduces its net resource transfer by nearly p if it fails to repay fully and by $1 > p$ if it does repay fully.

But if the resources used to buy debt does not affect what creditors can later hope to collect (as might be the case when funds were donated for that purpose) then spending p now only reduces payments (by 1) if full repayment is made, which occurs with probability 1-F(D), but not at all otherwise. Since p

exceeds the probability of full repayment, the debtor loses. The scheme is a "boondoggle" for the creditor.

An empirical issue is the effect that buybacks have had on the value of remaining debt. The value of λ determines how the price of remaining debt responds to the buyback. Differentiating the expression for $p = V(D)/D$ at B, the amount of debt bought back, and evaluating at $B = 0$ gives:

$$\frac{dp}{dB} = [p - 1 + (1-\lambda)F(D)]/D.$$

Hence, under Bulow-Rogoff presumption that the buyback does not affect resources available for repayment ($\lambda = 0$) the price of remaining debt rises after a buyback (since $p \geq 1 - F(D)$). In the limiting case in which there is no possibility of all debt being paid off ($F(D) = 1$) then $dp/p = E/D = -dD/D$; so that pD is unchanged. The value of remaining debt outstanding is unaffected by the buyback since it has no effect on what the creditors expect to receive subsequently.

On the other hand, if resources used for a buyback decrease what is available for repayment unit for unit ($\lambda = 1$) then the price of remaining debt falls after a buyback. Only in the limiting case in which repayment is assured, so that $p = 1$, is there no effect.

9.2 Buybacks as a Cure for Debt Hangovers

So far, this analysis assumes that there is no excess burden associated with debt, so that the only question arising from the buyback is how it affects the net resource transfer from debtor to creditor. Since total resources are given there is no potential for a net gain to both parties.

In fact, one argument in favor of buybacks is their potential to eliminate inefficiencies associated with the debt overhang.[8] A very stark example that illustrates how they could builds on the public finance constraint introduced in section 6.

Say that a government initially owes an amount D in a future period. It can raise an amount $T_0 < D$ by taxing resources in inelastic supply (like land) but must raise the rest by taxing the return to capital investment projects. These projects yield F(K) before tax, where K is the amount invested. $F(0) = 0$, and F is increasing, but at a diminishing rate. If K is positive then the tax rate t is set so that $D = T_0 + tF(K)$. The after-tax return on domestic investment $r^H(K)$ is thus:

$$r^H(K) = F'(K)(1-t) = F'(K)[1+(T_0-D)/F(K)].$$

At $K = 0$ the marginal return to investment is negative infinity, since all the proceeds of any investment will be taxed to try to pay the debt. Hence, as long as there is a foreign investment opportunity (earning r^W), then no investment (capital flight) is an equilibrium. There may also be another equilibrium with investment sufficient to repay the debt and provide a competitive return. Say that this investment amount is K*. In the flight equilibrium only T_0 is repaid, while in the second, all is repaid.

Say that the expectation is that K* will be invested with probability π. Then the value of the debt is $V(D) = (1-\pi)T_0 + \pi D$, and the price $p(D) = (1-\pi)T_0/D + \pi$.

Consider now a buyback of an amount B of nominal debt. If the probability of capital flight remains $1-\pi$ as long as the possibility remains

[8] See, for example, Krugman (1989) and Helpman (1990).

then buying back an amount $B < D - T_0$ will occur at a price $\pi + (1-\pi)T_0/D$. Debt service will be reduced by B with probability π and by $-\lambda pB$ with probability $1-\pi$. The net effect on net resource transfers to creditors is:

$$(1-\pi)B(T_0B/D - \lambda[\pi+(1-\pi)T_0B/D]),$$

which, as before, is positive if $\lambda = 0$ but negative if $\lambda = 1$.

Consider, however, a buyback $B \geq D-T_0$ if $\lambda = 0$. Such a buyback ensures that nondistortionary taxes suffice to repay the remaining debt the next period. The possibility of a tax on investment is eliminated. Hence the probability of repayment is raised to one.

If creditors realize the extent of the buyback, the price of debt will rise to one, so debt must be bought at par. The debtor must spend B now and D-B the next period on debt. Hence the buyback makes full repayment certain. But the debtor's expected income over the two periods rises from $\pi[F(K^*)-D] + (1-\pi)[r^WK^*-T_0]$ to $F(K^*)-D$, which is an increase as long as $F(K^*)-r^WK^* \geq D-T_0$, or as long as the difference between national incomes in the no-flight and flight cases exceeds the difference in debt repayment between those two cases.

The buyback benefits both parties in this example by eliminating possible distortions due to delay. Since capital is inelastically supplied in the short run but elastically supplied in the long run, future taxes to finance repayment provide more scope for distortion than current taxes. Hence a buyback, by moving more of the repayment up front, may require less distortionary taxation than the original repayment schedule.

Note, however, that if this argument has merit then the frequent claim that lengthening maturities will alleviate debt problems is invalid. On the contrary, to impose the minimum excess burden, repayment is to be gotten over

with quickly. Delay just increases the potential distortions imposed by raising the revenue needed to repay.

Buybacks and the Laffer Curve

Note that the buyback may benefit both parties even though the situation is not characterized by a "debt Laffer curve," contrary to claims that appear in the literature. Forgiving any amount of debt B less than $D-T_0$ will cause expected repayment to fall by πB, while forgiving an amount in excess of $D-T_0$ will cause expected repayment fall from $\pi D - (1-\pi)T_0$ to below T_0. In neither case does debt forgiveness increase the value of the debt.

In conclusion, a debt buyback can benefit a debtor. This requires, however, either that funds used to buy back debt reduce what is available subsequently for repayment (in which case the buyback is necessarily at the expense of the creditor) or that it reduce or eliminate a distortion associated with a debt overhang (in which case the buyback can benefit the creditor as well).

10. Conclusion

Clearly, the issue of sovereign debt raises a large number of complex issues that have yet to be fully worked out. A reason that much work remains to be done is that most economic thinking has posited that contracts are automatically enforceable. But lack of enforceability is key to the sovereign debt problem. Moreover, sovereign debt raises issues that are intrinsically political as well as more traditionally economic. For sovereign debt to be amenable to economic analysis, our tool kits must be enlarged to allow for an analysis of political outcomes.

Limitations of space and time have forced me to ignore a number of important issues that have received attention. Examples are the literature on bargaining between debtors and creditors (for example, Bulow and Rogoff (1989a) and Fernandez and Rosenthal (1990)), work on nontraded goods and the real exchange rate (see, e.g., Glick and Kharas (1984), Alexander (1987)), and the implications of land values and monopoly rents for foreign indebtedness (see, e.g., Eaton (1988,1989b)).

While much theoretical and empirical work remains to be done, it is clear from the experience of the last decade that international capital markets have not functioned smoothly: There is little reason to think that current institutional arrangements can achieve an outcome in which the marginal productivity of capital is the same everywhere. What capital movements have occurred have led to financial crisis, political conflict and government bailouts. An outstanding research issue is how to motivate international financial institutions to do a better job.

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FLOWS FROM PRIVATE CREDITORS

	1969	1970	1971	1972	1973	1974	1975	1976
	1+ 3 MONTH T-BILL RATE							
	1.0668	1.0646	1.0435	1.0407	1.0704	1.0789	1.0584	1.0499
CUM DISC RATE		1.0668	1.1357	1.1850	1.2333	1.3201	1.4242	1.5074
	(up to previous year)							
008 Argentina								
030 Disbursements - Commercial Banks		52,800,000	125,200,000	176,500,000	310,200,000	343,300,000	67,300,000	1,248,000,000
038 Principal Repayments - Commercial Banks		69,000,000	55,600,000	16,800,000	55,600,000	171,000,000	162,500,000	187,700,000
046 Interest Payments - Commercial Banks		8,700,000	11,200,000	16,600,000	35,900,000	71,200,000	78,900,000	74,000,000
Undiscounted Accumulated Flow		(24,900,000)	58,400,000	143,100,000	218,700,000	107,100,000	(174,100,000)	986,300,000
Discounted Accumulated Flow		(23,341,489)	51,423,751	120,755,357	177,331,476	81,129,802	(122,243,176)	654,324,622
020 Bolivia								
030 Disbursements - Commercial Banks		0	11,300,000	21,400,000	4,800,000	54,300,000	73,000,000	166,700,000
038 Principal Repayments - Commercial Banks		1,000,000	3,400,000	10,100,000	3,800,000	6,100,000	5,700,000	16,200,001
046 Interest Payments - Commercial Banks		100,000	1,100,000	1,400,000	2,400,000	3,000,000	8,900,000	17,100,000
Undiscounted Accumulated Flow		(1,100,000)	6,800,000	9,900,000	(1,400,000)	45,200,000	58,400,000	133,399,999
Discounted Accumulated Flow		(1,031,150)	5,987,697	8,354,144	(1,135,181)	34,239,655	41,005,178	88,499,345
022 Brazil								
030 Disbursements - Commercial Banks		333,100,000	506,300,000	938,499,968	1,272,300,032	2,280,999,936	2,585,100,032	2,907,200,000
038 Principal Repayments - Commercial Banks		137,000,000	171,500,000	195,400,000	234,700,000	232,100,000	396,400,000	424,500,000
046 Interest Payments - Commercial Banks		45,100,000	56,100,000	79,600,000	168,500,000	328,000,000	534,000,000	582,700,032
Undiscounted Accumulated Flow		151,000,000	278,700,000	663,499,968	869,100,032	1,720,899,936	1,654,700,032	1,899,999,968
Discounted Accumulated Flow		141,548,787	245,407,523	559,896,406	704,704,122	1,303,606,641	1,161,836,804	1,260,485,411
035 Chile								
030 Disbursements - Commercial Banks		118,700,000	59,600,000	77,100,000	61,400,000	103,900,000	81,800,000	136,900,000
038 Principal Repayments - Commercial Banks		31,700,000	24,500,000	11,100,000	14,300,000	42,200,000	53,500,000	115,600,000
046 Interest Payments - Commercial Banks		19,200,000	16,100,000	2,500,000	8,400,000	19,800,000	29,500,000	33,700,000
Undiscounted Accumulated Flow		67,800,000	19,000,000	63,500,000	38,700,000	41,900,000	(1,200,000)	(12,400,000)
Discounted Accumulated Flow		63,556,343	16,730,330	53,584,662	31,379,644	31,739,857	(842,572)	(8,226,326)
038 Colombia								
030 Disbursements - Commercial Banks		8,200,000	25,000,000	103,200,000	91,700,000	139,700,000	127,200,000	19,000,000
038 Principal Repayments - Commercial Banks		12,300,000	10,700,000	9,100,000	30,500,000	91,100,000	9,600,000	12,300,000
046 Interest Payments - Commercial Banks		2,300,000	1,500,000	2,100,000	8,300,000	14,800,000	23,400,000	25,600,000
Undiscounted Accumulated Flow		(6,400,000)	12,800,000	92,000,000	52,900,000	33,800,000	94,200,000	(18,900,000)
Discounted Accumulated Flow		(5,999,419)	11,270,959	77,634,472	42,893,622	25,603,990	66,141,914	(12,538,513)

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1977	1978	1979	1980	1981	1982	1983
1+ 3 MONTH T-BILL RATE	1.0527	1.0722	1.1004	1.1151	1.1403	1.1069	1.0862
CUM DISC RATE (up to previous year)	1.5826	1.6659	1.7862	1.9655	2.1917	2.4991	2.7662
008 Argentina							
030 Disbursements - Commercial Banks	584,900,032	1,514,000,000	2,299,500,032	2,173,399,808	1,135,500,032	639,200,000	1,663,500,032
038 Principal Repayments - Commercial Banks	272,300,000	1,118,300,032	299,800,000	481,000,000	555,400,000	503,300,000	458,900,000
046 Interest Payments - Commercial Banks	123,400,000	240,300,000	245,500,000	503,600,000	706,400,000	967,299,968	1,092,699,904
Undiscounted Accumulated Flow	189,200,032	155,399,968	1,754,200,032	1,188,799,808	(126,299,968)	(831,399,968)	111,900,128
Discounted Accumulated Flow	119,553,319	93,284,043	982,099,968	604,826,457	(57,627,139)	(332,673,728)	40,452,595
020 Bolivia							
030 Disbursements - Commercial Banks	242,800,000	329,600,000	125,900,000	99,000,000	27,500,000	42,500,000	13,900,000
038 Principal Repayments - Commercial Banks	38,500,000	207,800,000	65,699,996	55,300,000	37,200,000	23,300,000	16,500,000
046 Interest Payments - Commercial Banks	30,200,000	48,900,000	77,400,000	104,500,000	92,800,000	79,300,000	86,000,000
Undiscounted Accumulated Flow	174,100,000	72,900,000	(17,199,996)	(60,800,000)	(102,500,000)	(60,100,000)	(88,600,000)
Discounted Accumulated Flow	110,011,783	43,760,670	(9,629,526)	(30,933,256)	(46,767,880)	(24,048,222)	(32,029,454)
022 Brazil							
030 Disbursements - Commercial Banks	3,118,200,064	6,481,999,872	6,513,900,032	4,890,700,288	7,504,500,224	7,099,700,224	4,356,700,160
038 Principal Repayments - Commercial Banks	835,600,000	1,565,699,968	2,230,200,064	2,427,800,064	2,297,999,872	1,957,400,064	512,800,000
046 Interest Payments - Commercial Banks	697,200,000	1,157,200,000	2,023,100,032	3,121,899,776	4,033,499,904	4,761,700,352	3,991,600,128
Undiscounted Accumulated Flow	1,585,400,064	3,759,099,904	2,260,599,936	(658,999,552)	1,173,000,448	380,599,808	(147,699,968)
Discounted Accumulated Flow	1,001,796,020	2,256,525,802	1,265,611,153	(335,279,634)	535,207,259	152,291,992	(53,394,461)
035 Chile							
030 Disbursements - Commercial Banks	510,700,000	1,159,300,096	1,102,000,000	600,900,032	902,400,000	1,145,300,096	1,330,599,936
038 Principal Repayments - Commercial Banks	129,100,008	421,900,000	415,500,000	466,100,000	847,299,968	202,100,000	74,300,000
046 Interest Payments - Commercial Banks	45,400,000	141,300,000	216,700,000	332,600,000	363,900,000	437,000,000	424,700,000
Undiscounted Accumulated Flow	336,199,992	596,100,096	469,800,000	(197,799,968)	(308,799,968)	506,200,096	831,599,936
Discounted Accumulated Flow	212,440,898	357,829,076	263,020,497	(100,634,819)	(140,896,779)	202,549,290	300,628,573
038 Colombia							
030 Disbursements - Commercial Banks	163,200,000	41,800,000	675,200,000	500,400,000	796,200,000	531,599,968	419,200,000
038 Principal Repayments - Commercial Banks	28,500,000	52,600,000	229,000,000	51,500,000	57,800,000	57,700,000	83,300,000
046 Interest Payments - Commercial Banks	25,400,000	41,000,000	79,500,000	127,500,000	239,500,000	372,700,000	276,300,000
Undiscounted Accumulated Flow	109,300,000	(51,800,000)	366,700,000	321,400,000	498,300,000	101,199,968	59,600,000
Discounted Accumulated Flow	69,065,410	(31,094,687)	205,299,311	163,518,889	227,634,100	40,493,832	21,545,772

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1984	1985	1986	1987	1988	
1+ 3 MONTH T-BILL RATE	1.0958	1.0748	1.0598	1.0582	1.0669	
CUM DISC RATE (up to previous year)	3.0049	3.2928	3.5391	3.7507	3.9690	# of sign reversals PV of net flow
008 Argentina						
030 Disbursements - Commercial Banks	223,300,000	2,996 399,840	1,514,000,000	1,790,499,368	664,600,000	
038 Principal Repayments - Commercial Banks	84,700,000	430,900,000	716,299,968	245,000,000	0	
046 Interest Payments - Commercial Banks	1,797,600,000	3,072,100,096	2,582,300,160	2,767,100,160	1,725,500,032	
Undiscounted Accumulated Flow	(1,659,000,000)	(506,100,256)	(1,784,600,128)	(1,221,600,192)	(1,060,900,032)	6
Discounted Accumulated Flow	(552,093,221)	(153,699,088)	(504,252,424)	(325,695,870)	(267,294,403)	$586,260,852
020 Bolivia						
030 Disbursements - Commercial Banks	13,600,000	4,800,000	0	25,000,000	0	
038 Principal Repayments - Commercial Banks	11,300,000	9,300,000	6,800,000	6,000,000	29,200,000	
046 Interest Payments - Commercial Banks	28,700,000	3,400,000	2,100,000	1,800,000	3,000,000	
Undiscounted Accumulated Flow	(26,400,000)	(7,900,000)	(8,900,000)	17,200,000	(32,200,000)	6
Discounted Accumulated Flow	(8,785,570)	(2,399,174)	(2,514,763)	4,585,763	(8,112,809)	$169,057,249
022 Brazil						
030 Disbursements - Commercial Banks	6,939,799,552	295,800,000	221,300,000	45,900,000	2,916,000,000	
038 Principal Repayments - Commercial Banks	378,700,000	66,600,000	37,100,000	166,300,000	200,000	
046 Interest Payments - Commercial Banks	3,890,300,160	4,276,299,776	3,359,899,904	3,141,499,904	8,035,200,000	
Undiscounted Accumulated Flow	2,670,799,392	(4,047,099,776)	(3,175,699,904)	(3,261,899,904)	(5,119,400,000)	5
Discounted Accumulated Flow	888,806,655	(1,229,075,734)	(897,318,312)	(869,668,600)	(1,289,835,918)	$6,803,151,915
035 Chile						
030 Disbursements - Commercial Banks	922,499,968	701,400,000	325,500,000	3,000,000	100,000	
038 Principal Repayments - Commercial Banks	37,900,000	70,700,000	21,400,000	17,500,000	158,000,000	
046 Interest Payments - Commercial Banks	787,000,000	826,099,968	985,200,000	846,200,000	514,900,032	
Undiscounted Accumulated Flow	97,599,968	(195,399,968)	(681,100,000)	(860,700,000)	(672,800,032)	5
Discounted Accumulated Flow	32,479,976	(59,341,596)	(192,450,018)	(229,474,780)	(169,512,374)	$664,559,884
038 Colombia						
030 Disbursements - Commercial Banks	556,099,968	383,500,000	1,220,499,968	130,300,000	1,090,199,936	
038 Principal Repayments - Commercial Banks	183,900,000	258,900,000	374,400,000	532,700,000	823,299,968	
046 Interest Payments - Commercial Banks	282,000,000	359,000,000	320,400,000	370,500,000	399,000,000	
Undiscounted Accumulated Flow	90,199,968	(234,400,000)	525,699,968	(772,900,000)	(132,100,032)	8
Discounted Accumulated Flow	30,017,354	(71,185,631)	148,540,549	(206,066,060)	(33,282,683)	$769,493,181

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1969	1970	1971	1972	1973	1974	1975	1976
040 Congo, People's Republic of the								
030 Disbursements - Commercial Banks		0	0	6,100,000	12,700,000	900,000	8,900,000	7,100,000
038 Principal Repayments - Commercial Banks		0	0	700,000	1,500,000	2,600,000	3,200,000	1,300,000
046 Interest Payments - Commercial Banks		0	0	0	0	400,000	500,000	300,000
Undiscounted Accumulated Flow		0	0	5,400,000	11,200,000	(2,100,000)	5,200,000	5,500,000
Discounted Accumulated Flow		0	0	4,556,806	9,081,447	(1,590,780)	3,651,146	3,648,774
041 Costa Rica								
030 Disbursements - Commercial Banks		6,400,000	24,100,000	23,800,000	43,700,000	49,200,000	72,700,000	59,600,000
038 Principal Repayments - Commercial Banks		11,800,000	12,500,000	14,800,000	18,600,000	18,900,000	24,800,000	21,300,000
046 Interest Payments - Commercial Banks		1,900,000	2,300,000	2,400,000	3,700,000	7,900,000	11,500,000	11,100,000
Undiscounted Accumulated Flow		(7,300,000)	9,300,000	6,600,000	21,400,000	22,400,000	36,400,000	27,200,000
Discounted Accumulated Flow		(6,843,087)	8,189,056	5,569,429	17,352,051	16,968,3[illegible]	25,558,022	18,044,844
085 Cote d'Ivoire								
030 Disbursements - Commercial Banks		7,200,000	40,400,000	17,100,000	107,900,000	45,700,000	139,200,000	139,900,000
038 Principal Repayments - Commercial Banks		2,000,000	6,400,000	8,000,000	13,[illegible]00,000	36,200,000	23,300,000	45,500,000
046 Interest Payments - Commercial Banks		2,800,000	4,100,000	4,800,000	[illegible]0,300,0[illegible]	17,900,000	25,900,000	30,300,000
Undiscounted Accumulated Flow		2,400,000	29,900,000	4,300,000	84,500,000	(8,400,000)	90,000,000	64,100,000
Discounted Accumulated Flow		2,249,782	26,328,256	3,628,568	68,516,277	(6,363,122)	63,192,911	42,524,798
048 Ecuador								
030 Disbursements - Commercial Banks		2,200,000	3,200,000	55,800,000	16,200,001	35,500,000	89,900,000	115,700,000
038 Principal Repayments - Commercial Banks		2,500,000	3,800,000	4,600,000	5,200,000	45,500,000	7,400,000	24,300,000
046 Interest Payments - Commercial Banks		500,000	900,000	2,500,000	4,800,000	4,400,000	5,800,000	10,700,000
Undiscounted Accumulated Flow		(800,000)	(1,500,000)	48,700,000	6,200,001	(14,400,000)	76,700,000	80,700,000
Discounted Accumulated Flow		(749,927)	(1,320,816)	41,095,639	5,027,231	(10,908,209)	53,854,403	53,537,460
065 Greece								
030 Disbursements - Commercial Banks		48,600,000	72,000,000	300,400,000	160,600,000	540,900,032	506,500,000	91,000,000
038 Principal Repayments - Commercial Banks		8,900,000	10,200,000	26,100,000	62,900,000	53,300,000	117,600,000	138,100,000
046 Interest Payments - Commercial Banks		11,100,000	15,500,000	22,500,000	42,500,000	89,500,000	114,000,000	114,900,000
Undiscounted Accumulated Flow		28,600,000	46,300,000	251,800,000	55,200,000	398,100,032	274,900,000	(162,000,000)
Discounted Accumulated Flow		26,809,903	40,769,172	212,482,173	44,758,562	301,566,543	193,019,237	(107,472,968)
074 Honduras								
030 Disbursements - Commercial Banks		0	0	3,000,000	0	3,600,000	1,700,000	17,300,000
038 Principal Repayments - Commercial Banks		0	0	0	300,000	600,000	900,000	1,600,000
046 Interest Payments - Commercial Banks		0	0	0	100,000	300,000	500,000	1,000,000
Undiscounted Accumulated Flow		0	0	3,000,000	(400,000)	2,700,000	300,000	14,700,000
Discounted Accumulated Flow		0	0	2,531,559	(324,337)	2,045,289	210,643	9,752,177

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1977	1978	1979	1980	1981	1982	1983
040 Congo, People's Republic of the							
030 Disbursements - Commercial Banks	8,600,000	72,100,000	76,600,000	477,300,000	171,500,000	238,200,000	234,300,000
038 Principal Repayments - Commercial Banks	2,500,000	2,600,000	2,800,000	5,600,000	15,800,000	48,900,000	127,900,000
046 Interest Payments - Commercial Banks	400,000	800,000	8,300,000	12,200,000	59,300,000	67,300,000	73,400,000
Undiscounted Accumulated Flow	5,700,000	68,700,000	65,500,000	458,500,000	96,400,000	122,000,000	33,000,000
Discounted Accumulated Flow	3,601,764	41,239,479	36,670,589	233,271,345	43,984,621	48,816,690	11,929,706
041 Costa Rica							
030 Disbursements - Commercial Banks	133,000,000	125,500,000	267,500,000	123,900,000	121,100,000	14,700,000	10,700,000
038 Principal Repayments - Commercial Banks	30,600,000	148,000,000	136,600,000	42,000,000	39,400,000	11,800,000	30,800,000
046 Interest Payments - Commercial Banks	14,600,000	32,200,000	36,900,000	78,200,000	60,000,000	21,900,000	345,000,000
Undiscounted Accumulated Flow	87,800,000	(54,700,000)	94,000,000	3,700,000	21,700,000	(19,000,000)	(365,100,000)
Discounted Accumulated Flow	55,479,808	(32,835,510)	52,626,494	1,882,451	9,901,102	(7,602,599)	(131,985,931)
085 Cote d'Ivoire							
030 Disbursements - Commercial Banks	526,800,000	681,800,000	711,500,032	989,700,032	893,099,968	946,400,000	259,600,000
038 Principal Repayments - Commercial Banks	44,800,000	92,800,000	179,500,000	358,000,000	338,000,000	332,800,000	245,000,000
046 Interest Payments - Commercial Banks	56,300,000	105,000,000	151,700,000	246 400,000	298,800,000	360,000,000	298,300,000
Undiscounted Accumulated Flow	425,700,000	484,000,000	380,300,032	385,300,032	256,299,968	253,600,000	(283,700,000)
Discounted Accumulated Flow	268,994,921	290,537,234	212,913,375	196,029,350	116,942,499	101,474,694	(102,559,323)
048 Ecuador							
030 Disbursements - Commercial Banks	426,900,000	367,600,000	890,600,000	505,600,000	538,000,000	40,700,000	26,300,000
038 Principal Repayments - Commercial Banks	35,700,000	64,900,000	510,200,000	109,900,000	102,300,000	179,100,000	8,000,000
046 Interest Payments - Commercial Banks	25,100,000	63,200,000	117,500,000	184,400,000	277,100,000	364,300,000	253,500,000
Undiscounted Accumulated Flow	366,100,000	239,500,000	262,900,000	211,300,000	158,600,000	(502,700,000)	(235,200,000)
Discounted Accumulated Flow	231,334,369	143,767,908	147,186,226	107,503,239	72,364,739	(201,148,773)	(85,026,270)
065 Greece							
030 Disbursements - Commercial Banks	316,600,000	529,400,032	421,500,000	1,190,000,000	1,129,800,064	921,800,000	1,382,899,968
038 Principal Repayments - Commercial Banks	206,900,000	163,800,000	208,500,000	254,500,000	323,500,000	305,600,000	297,200,000
046 Interest Payments - Commercial Banks	93,300,000	131,899,992	205,800,000	304,900,000	569,900,032	440,300,000	520,400,032
Undiscounted Accumulated Flow	16,400,000	233,700,040	7,200,000	630,600,000	236,400,032	175,900,000	565,299,936
Discounted Accumulated Flow	10,362,971	140,286,288	4,030,965	320,830,775	107,862,715	70,384,064	204,359,459
074 Honduras							
030 Disbursements - Commercial Banks	40,100,000	36,900,000	104,800,000	52,800,000	78,200,000	30,200,000	39,800,000
038 Principal Repayments - Commercial Banks	3,700,000	7,700,000	33,099,998	13,400,000	11,800,000	8,500,000	5,500,000
046 Interest Payments - Commercial Banks	3,300,000	5,600,000	12,800,000	25,800,000	33,200,000	46,000,000	28,400,000
Undiscounted Accumulated Flow	33,100,000	23,600,000	58,900,002	13,600,000	33,200,000	(24,300,000)	5,900,000
Discounted Accumulated Flow	20,915,508	14,166,692	32,975,538	6,919,281	15,148,230	(9,723,324)	2,132,887

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1984	1985	1986	1987	1988	
040 Congo, People's Republic of the						
030 Disbursements - Commercial Banks	200,800,000	310,500,000	453,200,000	366,400,000	145,600,000	
038 Principal Repayments - Commercial Banks	144,800,000	143,700,000	183,600,000	75,700,000	109,300,000	
046 Interest Payments - Commercial Banks	61,300,000	63,100,000	57,800,000	12,300,000	30,200,000	
Undiscounted Accumulated Flow	(5,300,000)	103,700,000	211,800,000	278,400,000	6,100,000	4
Discounted Accumulated Flow	(1,763,770)	31,492,961	59,845,711	74,225,373	1,536,899	$604,198,761
041 Costa Rica						
030 Disbursements - Commercial Banks	1,000,000	88,100,000	600,000	0	2,300,000	
038 Principal Repayments - Commercial Banks	30,500,000	25,000,000	3,700,000	1,500,000	9,400,000	
046 Interest Payments - Commercial Banks	119,000,000	211,600,000	81,300,000	36,900,000	53,300,000	
Undiscounted Accumulated Flow	(148,500,000)	(148,500,000)	(84,400,000)	(38,400,000)	(60,400,000)	4
Discounted Accumulated Flow	(49,418,833)	(45,098,405)	(23,847,866)	(10,237,983)	(15,217,816)	($111,516,448)
085 Cote d'Ivoire						
030 Disbursements - Commercial Banks	143,300,000	136,500,000	86,000,000	18,100,000	64,500,000	
038 Principal Repayments - Commercial Banks	86,300,000	76,300,000	123,100,000	52,500,000	51,200,000	
046 Interest Payments - Commercial Banks	307,400,000	290,500,000	317,600,000	193,600,000	31,300,000	
Undiscounted Accumulated Flow	(250,400,000)	(230,300,000)	(354,700,000)	(228,000,000)	(18,000,000)	3
Discounted Accumulated Flow	(83,329,803)	(69,940,490)	(100,223,200)	(60,788,021)	(4,535,111)	$965,593,596
048 Ecuador						
030 Disbursements - Commercial Banks	446,200,000	235,300,000	336,800,000	42,800,000	58,000,000	
038 Principal Repayments - Commercial Banks	69,200,000	97,100,000	8,200,000	17,900,000	17,400,000	
046 Interest Payments - Commercial Banks	662,600,000	542,099,968	458,300,000	113,800,000	63,100,000	
Undiscounted Accumulated Flow	(285,600,000)	(403,899,968)	(129,700,000)	(88,900,000)	(22,500,000)	4
Discounted Accumulated Flow	(95,043,896)	(122,661,579)	(36,647,728)	(23,701,996)	(5,668,889)	$272,793,132
065 Greece						
030 Disbursements - Commercial Banks	1,416,999,936	2,075,300,096	1,103,300,096	1,273,699,968	1,463,200,000	
038 Principal Repayments - Commercial Banks	374,900,000	489,200,000	660,700,032	1,739,300,096	1,377,800,064	
046 Interest Payments - Commercial Banks	515,000,000	686,400,000	677,800,000	694,499,968	775,500,032	
Undiscounted Accumulated Flow	527,099,936	899,700,096	(235,199,936)	(1,160,100,096)	(690,100,096)	3
Discounted Accumulated Flow	175,411,876	273,232,590	(66,457,542)	(309,299,076)	(173,871,136)	$1,469,066,572
074 Honduras						
030 Disbursements - Commercial Banks	13,800,000	44,200,000	11,800,000	2,400,000	7,800,000	
038 Principal Repayments - Commercial Banks	6,400,000	7,000,000	8,500,000	46,800,000	10,400,000	
046 Interest Payments - Commercial Banks	22,400,000	25,400,000	15,000,000	10,000,000	8,500,000	
Undiscounted Accumulated Flow	(15,000,000)	11,200,000	(11,700,000)	(54,400,000)	(11,100,000)	7
Discounted Accumulated Flow	(4,931,801)	3,401,361	(3,305,925)	(14,503,809)	(2,796,652)	$74,553,317

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1969	1970	1971	1972	1973	1974	1975	1976
078 India								
030 Disbursements - Commercial Banks		15,600,000	23,000,000	7,800,000	1,700,000	14,300,000	10,200,000	9,400,000
038 Principal Repayments - Commercial Banks		9,600,000	14,600,000	18,300,000	20,200,000	18,100,000	8,100,001	12,000,000
046 Interest Payments - Commercial Banks		2,900,000	6,300,000	6,100,000	4,900,000	2,400,000	1,900,000	2,000,000
Undiscounted Accumulated Flow		3,300,000	2,100,000	(16,600,000)	(23,400,000)	(6,200,000)	200,000	(4,600,000)
Discounted Accumulated Flow		3,093,450	1,849,142	(14,007,959)	(18,973,738)	(4,696,590)	140,428	(3,051,702)
079 Indonesia								
030 Disbursements - Commercial Banks		300,000	0	134,300,000	212,700,000	224,600,000	1,177,500,032	434,800,000
038 Principal Repayments - Commercial Banks		500,000	200,000	200,000	15,100,000	26,400,000	83,000,000	116,900,000
046 Interest Payments - Commercial Banks		0	0	0	5,700,000	13,000,000	56,600,000	155,500,000
Undiscounted Accumulated Flow		(200,000)	(200,000)	134,100,000	191,900,000	185,200,000	1,037,900,032	162,400,000
Discounted Accumulated Flow		(187,482)	(176,109)	113,160,681	155,600,870	140,291,684	728,754,718	107,738,334
086 Jamaica								
030 Disbursements - Commercial Banks		1,000,000	9,600,000	31,400,000	102,500,000	165,300,000	156,700,000	30,600,000
038 Principal Repayments - Commercial Banks		2,400,000	2,600,000	11,500,000	6,200,000	22,000,000	17,200,000	35,600,000
046 Interest Payments - Commercial Banks		1,200,000	1,300,000	3,500,000	6,600,000	19,600,000	33,300,000	37,400,000
Undiscounted Accumulated Flow		(2,600,000)	5,700,000	16,400,000	89,700,000	123,700,000	106,200,000	(42,400,000)
Discounted Accumulated Flow		(2,437,264)	5,019,099	13,639,188	72,732,663	93,704,543	74,567,635	(28,128,728)
109 Mexico								
030 Disbursements - Commercial Banks		431,600,000	479,600,000	584,000,000	1,689,100,032	2,379,800,064	3,111,100,160	4,561,500,160
038 Principal Repayments - Commercial Banks		265,900,000	256,000,000	312,300,000	483,400,000	296,700,000	431,400,000	824,000,000
046 Interest Payments - Commercial Banks		105,700,000	104,300,000	118,200,000	187,600,000	384,500,000	610,499,968	803,700,032
Undiscounted Accumulated Flow		60,000,000	119,100,000	153,500,000	1,018,100,032	1,698,600,064	2,069,200,192	2,933,800,128
Discounted Accumulated Flow		56,244,551	104,872,752	123,531,428	825,519,806	1,266,714,164	1,452,875,380	1,946,322,275
111 Morocco								
030 Disbursements - Commercial Banks		0	0	0	0	0	140,000,000	376,300,000
038 Principal Repayments - Commercial Banks		0	0	0	0	0	0	0
046 Interest Payments - Commercial Banks		0	0	0	0	0	0	6,200,000
Undiscounted Accumulated Flow		0	0	0	0	0	140,000,000	370,100,000
Discounted Accumulated Flow		0	0	0	0	0	98,300,084	245,529,294
120 Nicaragua								
030 Disbursements - Commercial Banks		11,600,000	29,500,000	52,600,000	108,800,000	93,400,000	107,300,000	19,800,000
038 Principal Repayments - Commercial Banks		10,500,000	17,500,000	14,200,000	42,700,000	11,600,000	10,800,000	25,300,000
046 Interest Payments - Commercial Banks		3,200,000	3,600,000	5,800,000	11,200,000	20,300,000	26,200,000	30,000,000
Undiscounted Accumulated Flow		(2,100,000)	8,400,000	32,600,000	54,900,000	61,300,000	70,300,000	(35,500,000)
Discounted Accumulated Flow		(1,968,559)	7,396,567	27,509,606	44,515,309	46,135,638	49,360,685	(23,551,175)

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1977	1978	1979	1980	1981	1982	1983
078 India							
030 Disbursements - Commercial Banks	94,500,000	46,200,000	62,400,000	330,200,000	197,000,000	217,500,000	502,600,000
038 Principal Repayments - Commercial Banks	4,200,000	23,300,000	29,000,000	33,900,000	42,100,000	64,199,996	153,700,000
046 Interest Payments - Commercial Banks	1,700,000	13,300,000	17,700,000	113,300,000	156,100,000	203,400,000	322,900,000
Undiscounted Accumulated Flow	88,600,000	9,600,000	15,700,000	183,000,000	(1,200,000)	(50,099,996)	26,000,000
Discounted Accumulated Flow	55,985,318	5,762,722	8,789,744	93,105,030	(547,526)	(20,046,852)	9,399,162
079 Indonesia							
030 Disbursements - Commercial Banks	154,800,000	652,800,000	594,400,000	1,013,000,000	778,299,968	1,036,600,000	1,536,300,032
038 Principal Repayments - Commercial Banks	336,100,000	979,400,000	418,100,000	189,800,000	279,600,000	246,700,000	283,400,000
046 Interest Payments - Commercial Banks	182,800,000	131,399,992	198,000,000	268,000,000	389,600,000	474,800,000	451,000,000
Undiscounted Accumulated Flow	(414,100,000)	(457,999,992)	(21,700,000)	555,200,000	109,099,968	315,100,000	801,900,032
Discounted Accumulated Flow	(261,665,015)	(274,929,857)	(12,148,882)	282,469,468	49,779,260	126,083,108	289,891,872
086 Jamaica							
030 Disbursements - Commercial Banks	63,400,000	85,900,000	8,700,000	3,700,000	64,300,004	53,400,000	500,000
038 Principal Repayments - Commercial Banks	68,800,000	78,000,000	34,800,000	15,600,000	59,900,000	25,900,000	48,800,000
046 Interest Payments - Commercial Banks	29,500,000	33,700,000	45,600,000	54,500,000	39,400,000	61,500,000	72,900,000
Undiscounted Accumulated Flow	(34,900,000)	(23,800,000)	(71,700,000)	(66,400,000)	(34,999,996)	(34,000,000)	(121,200,000)
Discounted Accumulated Flow	(22,052,908)	(14,286,748)	(41,698)	(33,782,371)	(15,969,518)	(13,604,651)	(43,814,557)
109 Mexico							
030 Disbursements - Commercial Banks	4 987,399,680	7,234,999,808	9,465,099,264	7,625,100,288	10,063,099,904	8,085,299,712	5,282,700,288
038 Principal Repayments - Commercial Banks	1,870,300,032	3,961,499,904	6,280,500,224	3,444,899,840	3,085,199,872	2,063,500,032	2,631,500,032
046 Interest Payments - Commercial Banks	960,700,032	1,383,300,096	2,297,199,872	3,260,100,096	4,136,999,936	5,191,899,648	4,933,000,192
Undiscounted Accumulated Flow	2,156,399,616	1,890,199,808	887,399,168	920,100,352	2,840,900,096	829,900,032	(2,281,799,936)
Discounted Accumulated Flow	1,362,604,053	1,134,655,834	496,816,029	468,120,059	1,296,223,165	332,073,548	(824,884,935)
111 Morocco							
030 Disbursements - Commercial Banks	770,000,000	519,300,000	781,600,000	482,100,000	156,600,000	604,900,032	83,000,000
038 Principal Repayments - Commercial Banks	3,600,000	147,300,000	192,200,000	294,800,000	317,000,000	367,300,000	242,000,000
046 Interest Payments - Commercial Banks	57,700,000	119,000,000	212,900,000	371,300,000	434,800,000	337,800,000	315,500,000
Undiscounted Accumulated Flow	708,700,000	253,000,000	376,500,000	(184,000,000)	(595,200,000)	(100,199,968)	(474,500,000)
Discounted Accumulated Flow	447,819,358	151,871,736	210,785,903	(93,613,801)	(271,573,094)	(40,093,695)	(171,534,715)
120 Nicaragua							
030 Disbursements - Commercial Banks	95,200,000	38,100,000	0	0	0	1,800,000	1,700,000
038 Principal Repayments - Commercial Banks	33,400,002	34,200,000	2,600,000	20,200,000	10,200,000	14,300,000	1,100,000
046 Interest Payments - Commercial Banks	34,900,000	30,300,000	19,200,000	100,000	45,100,000	70,300,000	500,000
Undiscounted Accumulated Flow	26,899,998	(26,400,000)	(21,800,000)	(20,300,000)	(55,300,000)	(82,800,000)	100,000
Discounted Accumulated Flow	16,997,799	(15,847,485)	(12,204,868)	(10,328,044)	(25,231,842)	(33,131,328)	36,151

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1984	1985	1986	1987	1988	
078 India						
030 Disbursements - Commercial Banks	623,400,000	767,400,000	1,742,400,000	1,449,699,968	1,672,899,968	
038 Principal Repayments - Commercial Banks	178,000,000	202,500,000	422,000,000	383,500,000	430,900,000	
046 Interest Payments - Commercial Banks	396,200,000	493,700,000	709,600,000	921,700,032	1,240,499,968	
Undiscounted Accumulated Flow	49,200,000	71,200,000	610,800,000	144,499,936	1,500,000	5
Discounted Accumulated Flow	16,373,108	21,622,939	172,586,215	38,525,724	377,926	$366,286,542
079 Indonesia						
030 Disbursements - Commercial Banks	658,800,000	796,200,000	1,037,699,9[illegible]	755,800,000	1,360,099,968	
038 Principal Repayments - Commercial Banks	482,100,000	994,800,000	423,900,000	777,000,000	1,820,000,000	
046 Interest Payments - Commercial Banks	569,900,032	440,400,000	457,300,000	508,200,000	518,700,000	
Undiscounted Accumulated Flow	(393,200,032)	(639,000,000)	156,499,968	(529,400,000)	(978,600,032)	6
Discounted Accumulated Flow	(130,851,761)	(194,059,805)	44,220,264	(141,145,520)	(246,558,868)	$776,266,959
086 Jamaica						
030 Disbursements - Commercial Banks	21,100,000	11,200,000	0	0	0	
038 Principal Repayments - Commercial Banks	500,000	5,000,000	9,500,000	10,300,000	9,000,000	
046 Interest Payments - Commercial Banks	74,900,000	68,300,000	50,800,000	47,800,000	37,500,000	
Undiscounted Accumulated Flow	(54,300,000)	(62,100,000)	(60,300,000)	(58,100,000)	(46,500,000)	2
Discounted Accumulated Flow	(18,070,321)	(18,859,333)	(17,038,226)	(15,490,281)	(11,715,703)	($35,529,179)
109 Mexico						
030 Disbursements - Commercial Banks	3,148,800,000	1,883,000,064	449,600,000	4,903,499,77[illegible]	2,166,000,128	
038 Principal Repayments - Commercial Banks	1,936,699,904	889,200,000	709,000,000	684,700,032	544,800,000	
046 Interest Payments - Commercial Banks	5,712,999,936	6,034,399,744	4,656,700,416	4,714,399,744	4,599,000,064	
Undiscounted Accumulated Flow	(4,500,899,840)	(5,040,599,680)	(4,916,100,416)	(495,600,000)	(2,977,799,936)	1
Discounted Accumulated Flow	(1,497,839,838)	(1,530,794,666)	(1,389,081,797)	(132,133,962)	(750,258,490)	$4,767,579,356
111 Morocco						
030 Disbursements - Commercial Banks	95,000,000	0	10,000,000	61,900,000	0	
038 Principal Repayments - Commercial Banks	2,100,000	4,000,000	7,600,000	0	13,400,000	
046 Interest Payments - Commercial Banks	273,200,000	188,200,000	157,900,000	253,300,000	243,200,000	
Undiscounted Accumulated Flow	(180,300,000)	(192,200,000)	(155,500,000)	(191,400,000)	(256,600,000)	1
Discounted Accumulated Flow	(60,001,451)	(58,369,788)	(43,937,715)	(51,029,944)	(64,650,525)	$299,501,648
120 Nicaragua						
030 Disbursements - Commercial Banks	1,600,000	0	1,600,000	4,300,000	0	
038 Principal Repayments - Commercial Banks	700,000	100,000	100,000	0	0	
046 Interest Payments - Commercial Banks	11,100,000	10,400,000	100,000	0	0	
Undiscounted Accumulated Flow	(10,200,000)	(10,500,000)	1,400,000	4,300,000	0	7
Discounted Accumulated Flow	(3,394,425)	(3,188,776)	395,581	1,146,441	0	$64,947,274

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1969	1970	1971	1972	1973	1974	1975	1976
125 Pakistan								
030 Disbursements - Commercial Banks		0	0	0	0	0	0	0
038 Principal Repayments - Commercial Banks		0	0	0	0	0	0	0
046 Interest Payments - Commercial Banks		0	0	0	0	0	0	0
Undiscounted Accumulated Flow		0	0	0	0	0	0	0
Discounted Accumulated Flow		0	0	0	0	0	0	0
128 Paraguay								
030 Disbursements - Commercial Banks		1,900,000	0	4,000,000	5,500,000	9,500,000	12,900,000	3,500,000
038 Principal Repayments - Commercial Banks		300,000	300,000	700,000	1,700,000	2,400,000	4,800,000	2,400,000
046 Interest Payments - Commercial Banks		0	200,000	300,000	500,000	900,000	1,800,000	1,800,000
Undiscounted Accumulated Flow		1,600,000	(500,000)	3,000,000	3,300,000	6,200,000	6,300,000	(700,000)
Discounted Accumulated Flow		1,429,855	(440,272)	2,531,559	2,675,784	4,696,590	4,423,504	(464,389)
129 Peru								
030 Disbursements - Commercial Banks		3,000,000	2,900,000	119,500,000	369,300,000	612,600,000	377,900,000	357,100,000
038 Principal Repayments - Commercial Banks		25,000,000	24,700,000	27,200,000	148,200,000	134,500,000	31,400,000	50,100,000
046 Interest Payments - Commercial Banks		11,700,000	12,600,000	10,200,000	26,800,000	56,400,000	114,600,000	111,800,000
Undiscounted Accumulated Flow		(33,700,000)	(34,400,000)	82,100,000	194,300,000	421,700,000	231,900,000	195,200,000
Discounted Accumulated Flow		(31,590,690)	(30,290,703)	69,280,327	157,546,894	319,443,861	162,827,068	129,498,293
130 Philippines								
030 Disbursements - Commercial Banks		49,900,000	9,900,000	50,800,000	14,000,000	136,700,000	190,900,000	161,100,000
038 Principal Repayments - Commercial Banks		39,200,000	18,400,000	34,800,000	69,200,000	68,200,000	82,400,000	51,800,000
046 Interest Payments - Commercial Banks		10,900,000	20,200,000	15,600,000	6,600,000	15,000,000	29,300,000	33,000,000
Undiscounted Accumulated Flow		(200,000)	(28,700,000)	400,000	(61,800,000)	53,500,000	79,200,000	76,300,000
Discounted Accumulated Flow		(187,482)	(25,271,604)	337,541	(50,110,129)	40,527,025	55,609,762	50,618,441
141 Senegal								
030 Disbursements - Commercial Banks		0	0	0	35,900,000	10,600,000	23,000,000	21,200,000
038 Principal Repayments - Commercial Banks		0	0	0	0	1,000,000	2,600,000	4,900,000
046 Interest Payments - Commercial Banks		0	0	0	300,000	4,400,000	7,900,000	6,700,000
Undiscounted Accumulated Flow		0	0	0	35,600,000	5,200,000	12,500,000	9,600,000
Discounted Accumulated Flow		0	0	0	28,866,029	3,939,075	8,776,793	6,368,768
167 Turkey								
030 Disbursements - Commercial Banks		0	29,700,000	0	1,600,000	0	1,800,000	107,000,000
038 Principal Repayments - Commercial Banks		1,100,000	3,900,000	3,400,000	8,800,000	3,500,000	4,200,000	5,400,000
046 Interest Payments - Commercial Banks		700,000	1,300,000	2,000,000	2,300,000	1,800,000	1,800,000	9,800,000
Undiscounted Accumulated Flow		(1,800,000)	24,500,000	(5,400,000)	(9,500,000)	(5,300,000)	(4,200,000)	91,800,000
Discounted Accumulated Flow		(1,687,337)	21,573,320	(4,556,806)	(7,703,013)	(4,014,827)	(2,949,003)	60,901,349

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1977	1978	1979	1980	1981	1982	1983
125 Pakistan							
030 Disbursements - Commercial Banks	0	9,600,000	17,200,000	100,600,000	16,000,000	492,200,000	210,500,000
038 Principal Repayments - Commercial Banks	0	0	2,500,000	9,700,000	16,800,000	20,600,000	384,100,000
046 Interest Payments - Commercial Banks	0	100,000	1,100,000	9,000,000	16,100,000	53,500,000	71,800,000
Undiscounted Accumulated Flow	0	9,500,000	13,600,000	81,900,000	(16,900,000)	418,100,000	(245,400,000)
Discounted Accumulated Flow	0	5,70[illegible]694	7,614,046	41,668,317	(7,710,997)	167,297,199	(88,713,633)
128 Paraguay							
030 Disbursements - Commercial Banks	8,600,000	33,400,002	38,700,000	33,300,000	49,300,000	126,800,000	64,100,000
038 Principal Repayments - Commercial Banks	2,500,000	5,200,000	8,000,000	17,100,000	6,300,000	6,600,000	6,100,000
046 Interest Payments - Commercial Banks	1,300,000	3,800,000	4,400,000	11,800,000	7,100,000	11,600,000	9,500,000
Undiscounted Accumulated Flow	4,800,000	24,400,002	26,300,000	4,400,000	35,900,000	108,600,000	48,500,000
Discounted Accumulated Flow	3,033,065	14,646,920	14,724,221	2,238,591	16,380,165	43,454,857	17,533,053
129 Peru							
030 Disbursements - Commercial Banks	294,900,000	34,300,000	454,400,000	248,400,000	633,800,000	1,062,000,000	732,299,968
038 Principal Repayments - Commercial Banks	164,700,000	138,100,000	196,200,000	444,800,000	764,800,000	375,300,000	41,200,000
046 Interest Payments - Commercial Banks	132,899,992	157,900,000	202,300,000	273,900,000	253,500,000	273,400,000	213,300,000
Undiscounted Accumulated Flow	(2,699,992)	(261,700,000)	55,900,000	(470,300,000)	(384,500,000)	413,300,000	477,199,968
Discounted Accumulated Flow	(1,706,094)	(157,094,203)	31,295,968	(239,274,839)	(175,436,584)	165,376,542	172,510,770
130 Philippines							
030 Disbursements - Commercial Banks	310,600,000	606,099,968	830,400,000	662,800,000	552,000,000	1,062,499,968	762,600,000
038 Principal Repayments - Commercial Banks	38,000,000	305,300,000	201,600,000	43,500,000	107,900,000	181,700,000	236,300,000
046 Interest Payments - Commercial Banks	28,500,000	36,500,000	79,400,000	167,700,000	260,200,016	227,800,000	298,600,000
Undiscounted Accumulated Flow	244,100,000	264,299,968	549,400,000	451,600,000	183,899,984	652,999,968	227,700,000
Discounted Accumulated Flow	154,243,975	158,654,921	307,585,060	229,760,828	83,908,413	261,289,322	82,314,973
141 Senegal							
030 Disbursements - Commercial Banks	16,299,999	68,700,000	44,400,000	42,600,000	1,300,000	4,100,000	700,000
038 Principal Repayments - Commercial Banks	12,500,000	29,500,000	29,200,000	53,000,000	13,000,000	0	0
046 Interest Payments - Commercial Banks	8,500,000	11,900,000	17,000,000	20,000,000	17,000,000	8,400,000	4,100,000
Undiscounted Accumulated Flow	(4,700,001)	27,300,000	(1,800,000)	(30,400,000)	(28,700,000)	(4,300,000)	(3,400,000)
Discounted Accumulated Flow	(2,969,876)	16,387,741	(1,007,741)	(15,466,628)	(13,095,006)	(1,720,588)	(1,229,121)
167 Turkey							
030 Disbursements - Commercial Banks	384,600,000	305,700,000	3,028,300,032	600,200,000	163,700,000	481,700,000	354,400,000
038 Principal Repayments - Commercial Banks	7,100,000	61,300,000	114,000,000	154,300,000	183,600,000	160,800,000	293,000,000
046 Interest Payments - Commercial Banks	31,700,000	33,300,000	96,100,000	250,200,000	542,700,032	601,700,032	510,000,000
Undiscounted Accumulated Flow	345,800,000	211,100,000	2,818,200,032	195,700,000	(562,600,032)	(280,800,032)	(448,600,000)
Discounted Accumulated Flow	218,507,033	126,719,856	1,577,787,089	99,566,417	(256,698,641)	(112,358,428)	(162,171,703)

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1984	1985	1986	1987	1988	
125 Pakistan						
030 Disbursements - Commercial Banks	326,700,000	113,900,000	78,800,000	300,000,000	33,300,000	
038 Principal Repayments - Commercial Banks	165,000,000	266,200,016	38,500,000	126,400,000	178,000,000	
046 Interest Payments - Commercial Banks	59,700,000	43,200,000	28,200,000	29,400,000	44,300,000	
Undiscounted Accumulated Flow	102,000,000	(195,500,016)	12,100,000	144,200,000	(189,000,000)	7
Discounted Accumulated Flow	33,944,249	(59,371,980)	3,418,948	38,445,757	(47,618,664)	$94,675,935
128 Paraguay						
030 Disbursements - Commercial Banks	53,600,000	41,500,000	64,500,000	22,600,000	6,600,000	
038 Principal Repayments - Commercial Banks	16,900,000	22,200,000	35,300,000	27,000,000	36,500,000	
046 Interest Payments - Commercial Banks	17,800,000	27,900,000	20,200,000	11,300,000	19,300,000	
Undiscounted Accumulated Flow	18,900,000	(8,600,000)	9,000,000	(15,700,000)	(49,200,000)	7
Discounted Accumulated Flow	6,289,670	(2,611,760)	2,543,019	(4,185,842)	(12,395,870)	$116,572,618
129 Peru						
030 Disbursements - Commercial Banks	652,400,000	102,800,000	47,600,000	7,300,000	0	
038 Principal Repayments - Commercial Banks	60,100,000	58,700,000	32,200,000	3,200,000	0	
046 Interest Payments - Commercial Banks	213,400,000	141,400,000	32,099,998	1,600,000	0	
Undiscounted Accumulated Flow	378,900,000	(97,300,000)	(16,499,998)	2,500,000	0	7
Discounted Accumulated Flow	126,092,900	(29,549,326)	(4,662,201)	666,535	0	$664,934,522
130 Philippines						
030 Disbursements - Commercial Banks	206,500,000	405,000,000	528,500,000	7,700,000	8,000,000	
038 Principal Repayments - Commercial Banks	17,600,000	11,100,000	189,300,000	629,500,032	621,200,000	
046 Interest Payments - Commercial Banks	363,300,000	379,500,000	413,100,000	668,400,000	859,200,000	
Undiscounted Accumulated Flow	(174,400,000)	14,400,000	(73,900,000)	(1,290,200,032)	(1,472,400,000)	6
Discounted Accumulated Flow	(58,038,010)	4,373,179	(20,881,011)	(343,985,557)	(370,972,068)	$559,777,581
141 Senegal						
030 Disbursements - Commercial Banks	200,000	900,000	34,600,000	2,500,000	0	
038 Principal Repayments - Commercial Banks	7,300,000	4,900,000	14,600,000	25,900,000	29,000,000	
046 Interest Payments - Commercial Banks	12,100,000	13,100,000	7,300,000	9,900,000	9,900,000	
Undiscounted Accumulated Flow	(19,200,000)	(17,100,000)	12,700,000	(33,300,000)	(38,900,000)	5
Discounted Accumulated Flow	(6,389,506)	(5,193,150)	3,588,482	(8,878,250)	(9,800,878)	$2,176,143
167 Turkey						
030 Disbursements - Commercial Banks	590,400,000	1,021,800,000	1,516,899,968	1,958,499,968	2,527,200,000	
038 Principal Repayments - Commercial Banks	354,500,000	937,299,968	835,600,000	1,167,699,968	1,582,199,936	
046 Interest Payments - Commercial Banks	480,700,000	515,900,032	568,900,032	702,499,968	1,078,499,968	
Undiscounted Accumulated Flow	(244,800,000)	(431,400,000)	112,399,936	88,300,032	(133,499,904)	6
Discounted Accumulated Flow	(81,466,197)	(131,013,145)	31,759,462	23,542,036	(33,635,381)	$1,362,102,080

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1969	1970	1971	1972	1973	1974	1975	1976
173 Uruguay								
030 Disbursements - Commercial Banks		9,700,000	7,300,000	48,900,000	5,000,000	59,600,000	121,300,000	117,200,000
038 Principal Repayments - Commercial Banks		21,000,000	7,500,000	54,100,000	31,700,000	17,100,000	127,900,000	73,900,000
046 Interest Payments - Commercial Banks		7,100,000	5,600,000	5,900,000	3,100,000	4,600,000	6,900,000	10,200,000
Undiscounted Accumulated Flow		(18,400,000)	(5,800,000)	(11,100,000)	(29,800,000)	37,900,000	(13,500,000)	33,100,000
Discounted Accumulated Flow		(17,248,329)	(5,107,153)	(9,366,768)	(24,163,137)	28,709,799	(9,478,937)	21,958,983
175 Venezuela								
030 Disbursements - Commercial Banks		139,700,000	207,500,000	254,700,000	104,400,000	87,200,000	0	1,000,000,000
038 Principal Repayments - Commercial Banks		5,600,000	39,500,000	74,500,000	83,400,000	260,700,016	164,800,000	103,400,000
046 Interest Payments - Commercial Banks		15,800,000	21,100,000	30,600,000	52,300,000	68,900,000	45,400,000	20,600,000
Undiscounted Accumulated Flow		118,300,000	146,900,000	149,600,000	(31,300,000)	(242,400,016)	(210,200,000)	876,000,000
Discounted Accumulated Flow		110,895,507	129,351,866	126,240,402	(25,379,402)	(183,621,525)	(147,590,555)	581,150,125
181 Yugoslavia								
030 Disbursements - Commercial Banks		0	0	102,000,000	10,100,000	17,800,000	31,900,000	55,400,000
038 Principal Repayments - Commercial Banks		500,000	600,000	700,000	1,300,000	2,300,000	26,700,000	20,500,000
046 Interest Payments - Commercial Banks		100,000	100,000	3,800,000	8,600,000	13,500,000	13,800,000	10,900,000
Undiscounted Accumulated Flow		(700,000)	(700,000)	97,500,000	200,000	2,000,000	(8,600,000)	24,000,000
Discounted Accumulated Flow		(656,186)	(616,381)	82,275,663	162,169	1,515,029	(6,038,434)	15,921,921

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1977	1978	1979	1980	1981	1982	1983
173 Uruguay							
030 Disbursements - Commercial Banks	144,200,000	158,600,000	116,200,000	230,200,000	263,299,984	347,100,000	439,900,000
038 Principal Repayments - Commercial Banks	110,900,000	104,700,000	7,700,000	59,200,000	21,700,000	37,700,000	31,700,000
046 Interest Payments - Commercial Banks	7,700,000	10,800,000	18,700,000	49,600,000	66,199,996	100,000,000	152,300,000
Undiscounted Accumulated Flow	25,600,000	43,100,000	89,800,000	121,400,000	175,399,988	209,400,000	255,900,000
Discounted Accumulated Flow	16,176,345	25,872,221	50,275,097	61,764,758	80,030,133	83,788,647	92,509,449
175 Venezuela							
030 Disbursements - Commercial Banks	1,575,600,000	1,688,499,968	3,798,800,128	2,366,500,096	2,047,800,064	1,971,900,032	2,091,699,968
038 Principal Repayments - Commercial Banks	67,800,000	67,300,000	694,000,000	1,326,000,000	1,158,599,936	1,329,500,032	726,099,968
046 Interest Payments - Commercial Banks	119,400,000	276,200,000	460,700,000	1,052,800,064	1,051,199,936	1,470,499,968	1,601,800,064
Undiscounted Accumulated Flow	1,388,400,000	1,344,999,968	2,644,100,128	(12,299,968)	(161,999,808)	(828,099,968)	(236,200,064)
Discounted Accumulated Flow	877,313,951	807,381,344	1,480,316,158	(6,257,863)	(73,915,976)	(331,353,276)	(85,387,799)
181 Yugoslavia							
030 Disbursements - Commercial Banks	36,100,000	20,300,000	15,000,000	685,600,000	372,100,000	61,900,000	651,200,000
038 Principal Repayments - Commercial Banks	21,700,000	28,200,000	31,800,000	38,800,000	55,600,000	46,700,000	30,200,000
046 Interest Payments - Commercial Banks	11,900,000	18,100,000	19,000,000	17,200,000	162,400,000	175,100,000	122,700,000
Undiscounted Accumulated Flow	2,500,000	(26,000,000)	(35,600,000)	629,600,000	154,100,000	(159,900,000)	498,300,000
Discounted Accumulated Flow	1,579,721	(15,607,372)	(20,042,856)	320,322,004	70,311,515	(63,981,875)	180,138,564

Source: World Bank, World Debt Tables: 1989-1990

FLOWS FROM PRIVATE CREDITORS

	1984	1985	1986	1987	1988	
173 Uruguay						
030 Disbursements - Commercial Banks	53,300,000	35,900,000	11,400,000	56,500,000	0	
038 Principal Repayments - Commercial Bank	28,100,000	37,200,000	7,600,000	7,400,000	69,100,000	
046 Interest Payments - Commercial Banks	228,300,000	216,700,000	170,600,000	172,400,000	164,900,000	
Undiscounted Accumulated Flow	(203,100,000)	(218,000,000)	(166,800,000)	(123,300,000)	(234,000,000	4
Discounted Accumulated Flow	(67,588,989)	(66,205,067)	(47,130,617)	(32,873,522)	(58,956,44	$122,966,443
175 Venezuela						
030 Disbursements - Commercial Banks	514,200,000	140,900,000	73,400,000	294,000,000	391,400,000	
038 Principal Repayments - Commercial Bank	633,500,032	541,600,000	913,700,032	672,499,968	544,099,968	
046 Interest Payments - Commercial Banks	1,294,400,000	1,250,800,000	1,524,400,000	1,387,800,064	1,815,900,032	
Undiscounted Accumulated Flow	(1,413,700,032)	(1,651,500,000)	(2,364,700,032)	(1,766,300,032)	(1,968,600,000)	3
Discounted Accumulated Flow	(470,460,642)	(501,548,933)	(668,164,092)	(470 920,544)	(495,989,958)	$652,058,789
181 Yugoslavia						
030 Disbursements - Commercial Banks	3,100,000	38,200,000	186,300,000	0	307,000,000	
038 Principal Repayments - Commercial Bank	1,100,000	21,500,000	912,700,032	276,800,000	112,200,000	
046 Interest Payments - Commercial Banks	341,600,000	433,800,000	487,400,000	452,900,000	474,900,000	
Undiscounted Accumulated Flow	(339,600,000)	(417,100,000)	(1,213,800,032)	(729,700,000)	(280,100,000)	7
Discounted Accumulated Flow	(113,014,381)	(126,670,336)	(342,968,489)	(194,548,329)	(70,571,364)	($282,489,417)

Source: World Bank, World Debt Tables: 1989-1990

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